ARMY RESEARCH AND DEVELOPMENT

MONTHLY NEWSMAGAZINE OF THE OFFICE OF THE CHIEF, RESEARCH AND DEVELOPMENT

Vol. 9 No. 11 • December 1968 • HEADQUARTERS, DEPARTMENT OF THE ARMY • Washington, D.C.

SOMISS Report Stimulates Intensive Data Management Effort

Intensive, high priority effort is advancing the U.S. Army Management Information Systems Program in line with recent Chief of Staff approval of SOMISS report recommendations based on a 9-month, full-time study.

The SOMISS (Study of Management Information Systems Support) concept is linked to a time-phased (three phases) implementation program, extending over a 3-year period "to permit an orderly buildup" of Army capability to support activities of the many agencies involved.

Army Chief of Staff Memorandum 68–252, issued July 12, 1968, modifies certain SOMISS report recommendations and directs the General Staff actions to be accomplished in each phase of implementation activities.

Semiannual progress reports are required and initial reports from the Department of Army staff were submitted Oct. 15. Major commands have submitted to the Chief of Staff their plans in accordance with SOMISS recommendations.

Responsibility for monitoring the

(*Continued on page 4*)

U.S., U.K. Sign Fuel Cell Research Pact

Cooperative basic research on power-generating fuel cells became effective Nov. 15 when the United States and the United Kingdom signed a Memorandum of Understanding, providing for a 3-year joint program.

The agreement was consummated by the International Office, Office of the Chief of Research and Development, for the U.S. Department of the Army and by the United Kingdom Ministry of Defence (Navy Department).

In pooling efforts to achieve better understanding of the fundamental processes involved in fuel cell systems, the United States and the United Kingdom will seek to exploit practicably their advantages over present electrical power generating devices with respect to noise, air pollution and operational efficiency.

Research will seek to decrease the weight and volume of power generating systems, and will be directed principally to the optimum choice of materials for use as anodes, cathodes, electrolytes and fuels. Consideration also will be given to the most efficient structure for fuel cells.

Work will be performed through contracts with university and industrial laboratories as well as in government facilities. The Ministry of Defence (Navy Department) will direct the project for the United Kingdom and the U.S. Army will have responsibility for the U.S. activities.

MEMO OF UNDERSTANDING is signed by Admiral Louis LeBailey, Chief of the British Naval Staff, Washington, D.C., and Brig. Gen. Kenneth F. Dawalt, Deputy Chief of R&D for International Programs, OCRD. In background are (left) Herbert E. Hogben, scientific adviser to the commander of the British Naval Staff, and John Crellin, general physical scientist, U.S. Army Materiel Command.

Memo Expands R&D Role Of Corps of Engineers

Research and development authority and responsibilities of the U.S. Army Corps of Engineers are expanded and stated more precisely by a recently issued Army Chief of Staff Memorandum, which is a forerunner to an early revision of AR 10–5.

In the 1962 Army-wide reorganization, the Corps of Engineers and the Office of The Surgeon General were the only survivors among the Army's traditional seven Technical Services to retain their identity and R&D responsibility—except that certain of the materiel functions of the Corps of Engineers were transferred to the Army Materiel Command.

Under the general staff supervision of the Chief of Research and Development, the Chief of Engineers is charged by the Chief of Staff Memorandum with the following R&D missions:

• Accomplishing RDT&E projects, including basic and applied research required for the engineer mission as assigned, and providing research and development support to other U.S. Army, U.S. Air Force, National Aero-

(*Continued on page 5*)

ARPA Sets Final Tests Of New Jet Flying Belt

Final testing of an individual aerial mobility system that is a limited approach to man's age-old dream of being able to fly free like a bird is scheduled this month. A public demonstration will follow in the near future.

Termed the Jet Flying Belt, the system is the result of several years

(*Continued on page 3*)

Jet and Rocket Belt Configurations

Featured in This Issue . . .

ASA (R&D) O'Neal Compares Army, Industrial Laboratories ..... p. 2
Defense Secretary Clifford Urges R&D Coupling to Civilian Use ..... p. 3
Edgewood Arsenal Develops Automatic Alarm for Nerve Agents ..... p. 6
AR 70–35 Prescribes Procedures, Responsibilities for 5 Programs ..... p. 8
40-Year Saga of Antarctic Explorer, Dr. Paul A. Siple, Ends ..... p. 10
ECOM, CE Exhibit R&D Achievements at AAAS Meet in Dallas ..... p. 11
JSHS Advisory Council Adds 2 University Professors ..... p. 12
5 Laboratories Consolidated in Aberdeen PG R&D Center ..... p. 13
Major RDT&E, Procurement Contracts Total Over Billion Dollars ..... p. 14
SARS Fellow Reports on tRNA Research Project at Cambridge ..... p. 20
EDS&R to Provide Direct Access to Engineering-Based Data ..... p. 22
USACDC Commanders Discuss Army's 1975-85 Requirements ..... p. 28

Army R&D Newsmagazine

Vol. 9 No. 11 • December 1968

Editor . . . . . Clarence T. Smith
Associate Editor . . . . George J. Makuta
Assistant Editor . . . . . Read Wynn

Published monthly by the Army Research Office, Office of the Chief of Research and Development, Department of the Army, Washington, D.C. 20310, in coordination with the Technical and Industrial Liaison Office, OCRD. Grateful acknowledgment is made for the valuable assistance of Technical Liaison Offices within the U.S. Army Materiel Command, U.S. Continental Army Command, Office of the Chief of Engineers, and Office of The Surgeon General. Use of funds for printing of this publication has been approved by Headquarters, Department of the Army June 6, 1967.

Purpose: To improve informal communication among all segments of the Army scientific community and other Government R&D agencies; to further understanding of Army R&D progress, problem areas and program planning; to stimulate more closely integrated and coordinated effort among Army R&D activities; to express views of leaders, as pertinent to their responsibilities, and to keep personnel informed on matters germane to their welfare and pride of service.

Picture Credits: Unless otherwise indicated, all illustrations are by the U.S. Army.

Submission of Material: All articles submitted for publication must be channeled through the technical liaison or public information officer at installation or command level.

By-lined Articles: Primary responsibility for opinions of by-lined authors rests with them; their views do not necessarily reflect the official policy or position of the Department of the Army.

DISTRIBUTION is based on requirements submitted on DA Form 12-4. Army agency requirements must be mailed to the U.S. Army AG Publications Center, 2800 Eastern Boulevard, Baltimore, Md. 21220.

Distribution on an individual name basis is restricted to members of the U.S. Army Atomic Energy and R&D Officer Special Career Programs. Members of the U.S. Army Reserve R&D Unit Program receive distribution by bulk lot sent to their individual units. Otherwise, distribution is made only to the Army installation, office or organizational element to which the requester is assigned.

CHANGES OF ADDRESS for AE and R&D Officer Special Career Program enrollees should be addressed to: Specialist Branch, OPXC, Department of the Army, Stop 106 Washington, D.C. 20315. Reserve R&D Unit members should contact: Special Assistant for Reserve Affairs, OCRD, Department of the Army, Washington, D.C. 20310.

OTHER GOVERNMENT AGENCIES' requirements should be submitted directly to the Army Research Office, OCRD, Department of the Army, Washington, D.C. 20310, ATTN: Scientific and Technical Information Division.

ALL NON-U.S. GOVERNMENT agencies, firms and organizations must obtain this publication through the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Single copies sell for 20 cents. Subscription rates (12 issues annually) are: Domestic, APO and FPO addresses, $2.25; Foreign, $3.00

ASA (R&D) Compares Army, Industrial Labs

Army Materiel Command Chief Scientists Conference participants heard Assistant Secretary of the Army (R&D) Dr. Russell D. O'Neal discuss "Comparison of Government to Industrial Laboratories," Nov. 4, in St. Louis, Mo.

Until he resigned to accept his present position in October 1966, Dr. O'Neal distinguished himself as a research scientist and top level manager with numerous major industrial concerns. He was vice president, Aerospace Systems, Bendix Corp., when he resigned.

Dr. O'Neal told the chief scientists that both government and industry laboratories are "difficult to manage. I think that the most difficult management job is the one of managing a scientifically oriented laboratory . . . (because) we are dealing with people who do not take direction too easily. Management must be by leadership rather than by command."

Management problems are further complicated, he said, by the uncertainty of the course of action because of the difficulty of scheduling research. Laboratory management "must be continuously thinking of changes which should be made," depending upon the results of research.

In discussing the continual problem of avoiding or minimizing obsolescence in personnel and equipment, he said "those of us who are in the technical field sometimes fail to recognize how rapidly our fields do change, and how important it is for technical management and the workers to acquire new technologies rapidly.

"I think one of the fields which illustrates this more than any other at the present time is the field of integrated circuitry. We have moved from the

(Continued on page 26)

AMC Chief Scientists Consider AVSCOM Programs

Exchange of information on "Army Aviation Systems Command Use of Army Materiel Command (AMC) Commodity Commands and Command-Wide Laboratories" was the main business of AMC chief scientists at their fall meeting in St. Louis, Mo., Nov. 4–5.

AVSCOM Commander Maj Gen John Norton, host to the meeting, welcomed the conferees. AMC Chief Scientist Dr. Craig M. Crenshaw opened the meeting and joined with AMC scientific and technical directors in detailing capabilities of AMC installations available to AVSCOM for a joint attack on problem areas.

AVSCOM speakers briefed the visitors on command capabilities, mission responsibilities, projects in progress and problem areas, and the command's requirements for assistance from other AMC facilities. Presentations included an outline of present and future objectives.

ASA (R&D) Dr. Russell D. O'Neal and Dr. Craig M. Crenshaw, AMC chief scientist, at fall meeting of AMC chief scientists in St. Louis, Mo.

Assistant Secretary of the Army (R&D) Dr. Russell D. O'Neal made the principal address at the banquet. (Dr. O'Neal's presentation is reported beginning at the top of this page.)

Principals at the meeting included Dr. Gordon L. Bushey, AMC deputy chief scientist; Lewis L. Gober, chief engineer, Mobility Equipment Command; Dr. John P. Hallowes Jr., director, Physical Science Laboratory, Missile Command; Dr. Colin M. Hudson, chief scientist, Weapons Command; Dr. Ernest N. Petrick, chief scientist and technical director of laboratories, Army Tank-Automotive Command; and

Dr. Eraldus Scala, technical director, Army Materials and Mechanics Research Center; Paul F. Yaggy, technical director, U.S. Army Aeronautical Research Laboratory, NASA/Ames; Dr. Hans K. Ziegler, deputy for science and chief scientist, Electronics Command; Col Harry L. Bush, deputy commander for Research, Engineering and Data, Col Clifton O. Duty, deputy commander for Acquisition, Col Delbert L. Bristol, deputy for Logistics Support, William H. Barthel, assistant for RE&D, William H. Brabson Jr., chief, R&D Division, and Larry M. Hewin, technical director, all of AVSCOM.

Defense Secretary Urges R&D 'Coupling' to Civilian Use

Armed Forces R&D installations are searching much more intently for possibilities of relating the benefits of military-oriented R&D to many urgent requirements of the civilian population as a result of Secretary of Defense Clark M. Clifford's recent address to the National Security Industrial Association.

This problem of "coupling," that is, of insuring the more rapid application of new research knowledge to the design and development of new military materiel, through closer integration of effort and reports of findings between the military, industrial and academic communities, has been of rapidly increasing concern in recent years.

The 1966 Army Science Conference was centered on the theme of "Basic Research and Practical Relevancy." It was highlighted by a 4-hour panel discussion of experts representative of the Department of Defense, the Army, academic institutions, industry and the general public (the latter from the viewpoint of taxpayers interested in "pay-off" of military R&D).

Since then the Army has devoted continuing efforts directed to a solution of the coupling problem. Many of these activities have been reported in the *Army Research and Development Newsmagazine*, which recognized the problem of relating military R&D benefits to civilian needs as early as 1963. The special third anniversary 72-page December-January edition was devoted to the theme of "By-Product Benefits of Army R&D to the Civilian Population."

Secretary Clifford's NSIA address contained the following statement:

"Let there be no doubt as to my strong feeling that the Department of Defense has the opportunity and the responsibility to make a greater contribution to the social needs of the country, for it is my certain conviction that such action will contribute to our total national strength.

"Not too many years ago, the War and Navy Departments were concerned almost exclusively with men and simple machines. Defense industries were regarded as mere munitions makers. How remote that era seems!

"We now have a military industrial team with unique resources of experience, engineering talent, management and problem-solving capacities, a team that must be used to help find the answers to complex domestic problems as it has found the answers to complex weapons systems. Those answers can be put to good use by our cities and our states, by our schools, by large and small business alike. The Nation will be the better and the stronger."

Secretary of Defense Clark Clifford
Instructs military-industry team to apply R&D results to meet urgent requirements of the civilian population.

Final Tests Scheduled for Jet Flying Belt

(*Continued from page 1*)

of intensive developmental effort since the Bell Small Rocket Lift Device (SRLD) was publicly demonstrated in 1961. Since then the SRLD has proved 100 percent reliable in more than 3,000 experimental flights.

Precise operational capabilities of the JFB are classified except that it provides a "new dimension" to individual mobility for military needs. Payload is termed adequate for a variety of missions, with flexibility geared to existing military logistics. Range is described as "measured in miles—not feet" and endurance in "minutes—not seconds."

Propelled by the "world's most powerful small gas turbojet engine," the JFB impressively demonstrated its capabilities in recent free-flight semi-final tests before numerous leading U.S. Government officials. The system maneuvered successfully through several exercises to prove its qualities for forward, backward, side, up, and turn-around as well as for hovering and soft-landing.

Observers included representatives of the Department of Defense, the Joint Chiefs of Staff, the Army, Navy, Air Force and Marine Corps, Department of Transportation, Central Intelligence Agency, Department of Justice, International Association of Chiefs of Police and the National Aeronautics and Space Administration.

Development of the JFB is sponsored by the Advanced Research Projects Agency, Office of the Director of Defense Research and Engineering, Office of the Secretary of Defense. Alexander Tedesco is program manager. Under contract with the U.S. Army Aviation Command, the Bell Aerosystems Co. has primary developmental responsibility. Gas turbine work is performed by Williams Research Corp.

ARMY Vice Chief of Staff General Bruce Palmer Jr. tries on Jet Flying Belt, with assist from Robert J. May and Robert Courter of Bell Aerosystems Co. The Bell Co. developed the belt under sponsorship of the Advanced Research Projects Agency, Office of the Director of Defense Research and Engineering, under contract with the U.S. Army Aviation Systems Command (formerly Aviation Materiel Command), St. Louis, Mo.

Ruggedness, simplicity of operation and minimum maintenance are emphasized in JFB design—"self sufficiency in the field with minimum external support equipment for operation," Bell Aerosystems Co. states.

Carried by the operator with a suspension harness and shoulder straps, the JFB offers complete freedom of flight. Lift and maneuverability power comes from a propulsion unit affixed to a fiberglass hip pack or corset.

Potential applications of the JFB include conventional warfare, limited warfare, and peacetime operations in a variety of civilian roles.

Joining the "Jet Set" by acquiring a JFB for personal use may be quite a few years in the future, but the system beckons to that possibility with continued developmental effort.

SOMISS Report Stimulates Data Management Effort

(*Continued from page 1*)
implementation of all phases is assigned to the Management Information Systems Directorate (MISD).

An important change of the memorandum is that missions and functions formerly assigned to the Directorate of Automatic Data Processing, Comptroller of the Army (with the exception of control and staff supervision over the Army Information and Data Systems Command) are reassigned to the MISD, including personnel and space authorizations.

The Computer Systems Evaluation Command is transferred to the jurisdiction of the MISD and redesignated the Computer Systems Support and Evaluation Command, with additional support functions and personnel.

"Present Army procedures for acquiring information systems," the SOMISS report notes, "are difficult, expensive and unresponsive to the needs of users. The situation can be likened to that which would exist were weapons systems individually designed and procured for each division of the Army to meet the specifications formulated independently by each division.

"There presently is no organization which has an over-all responsibility to determine the need for, acquire and support technically, data processing systems to meet Army-wide requirements. . . . Large numbers of personnel are engaged in designing and operating systems of limited use which duplicate many others and which, though uniquely designed, should meet identical or similar common requirements."

The report observes that means do not exist for the Army to keep abreast of major industry advances in computer systems and computer technology which could be of marked advantage if used. Similarly, rapid advances in electronics and information technology have made sophisticated data processing equipment available faster than management technologies have developed.

Sufficient experience has now been accumulated in the Army, however, to enable knowledgeable assessment and conclusions to indicate what changes are required in management practices applied to information systems, the report states. It addresses "new approaches" to information systems management, requirements and organizational changes for Army-wide needs.

"The great expense in the use of computers," the report states, "is not the equipment but the cost of personnel required to design the systems, operate and maintain them. . . . The proliferation of computers has simply outpaced the Army's capability to train sufficient numbers of people in the needed skills."

Three basic groups of personnel capabilities are required: 1) functional area experts management-oriented to define, or assist in defining, specific requirements for management information; 2) systems analysts/designers; 3) programers.

Functional area experts "must also have sufficient understanding of data processing technology to be 'snow-proof' and be able to communicate with data processing technicians in their own language," the report explains. Personnel with this capability are "critically short."

The concept calls for initiative "from the top down." Rejected, because of the size and diversity of the Army, is the feasibility of a "single integrated vast data bank" maintained and operated to support requirements of HQ DA.

Instead, the approach is that functional staff chiefs must establish and maintain functional data banks and computation centers "which will equip them to continue their traditional responsibilities of collecting and analyzing data and furnishing recommendations to the Chief of Staff and the Secretary of the Army."

In the design and control of information systems, Army staff agencies are to be charged with achieving a "position of primacy," with the MISD responsible for ensuring that functional systems are mutually supporting, meet the information needs of HQ Department of the Army and higher and outside agencies, and are supportable in the field.

Capability for top-down management of information systems must be created, involving distribution of available resources "in a way that achieves the best possible utilization of scarce and expensive skills and equipment. . . . As groups of standard information systems are developed, compatible families of computer hardware can be acquired, using competitive procedures."

The report observes that while new capabilities must be established, some existing organizations strengthened and some new alignments made in channels of supervision, it is not expected that an increase in total resources will be required to accomplish the same work.

Principles defined for achieving this objective are:

- Improved HQ DA planning for the application of operating information systems design projects that cross command lines.
- Consolidation of responsibility within HQ DA for management of systems, hardware and software efforts.
- Increased visibility and capability for HQ DA functional staff elements responsible for planning Army-wide information systems in their functional area.
- Centralized management of information systems at the highest level within major commands.
- Increased communications and liaison between major commands and HQ DA.

Twenty recommendations approved by the Army Chief of Staff with modifications are contained in the SOMISS report. Several of these have been discussed in this article. Some of the others are:

- That teams be established in the U.S. Army Computer Systems Sup-

ASAP Slates Meeting at Edgewood

The U.S. Army Scientific Advisory Panel (ASAP) has scheduled its winter meeting at Edgewood (Md.) Arsenal, Feb. 16-18, as a full assembly of members and consultants. The theme of the meeting will be "Battlefield Flexibility—Alternatives to Nuclear and Conventional Weapons," which will cover topics in the chemical and biological areas.

DR. YU-CHI HO, associate professor of engineering and applied mathematics, Harvard University, is sworn in as the newest member of the Army Scientific Advisory Panel (ASAP) by Lt Col Wayne D. Miller, ASAP executive secretary. The ASAP is a 25-member group of top industrial and academic scientists, representing a wide variety of disciplines, appointed by the Secretary of the Army to counsel him, the Chief of Staff, the Assistant Secretary of the Army for R&D, and the Chief of R&D on Research, Development, Test and Evaluation (RDT&E) program planning.

port and Evaluation Command for on-site liaison wi'h major commands.

- That HQ DA General Staff agencies and selected special staff agencies (Office of the Chief of Engineers, Office of Personnel Operations, Office of The Surgeon General at a minimum) be responsible for development and formulation of detailed information system requirements, and for development of the functional portion of the HQ DA information system.
- That major commands establish a single organizational element (MIS-type organization) reporting to the deputy commander or chief of staff.
- That major commands establish, within functional staff agencies, a single organizational entity responsible for functional aspects of command information systems whenever ADP systems developments or operations are warranted as a major element of support for a given staff function.
- That the major commands establish central design agencies to accomplish the design, programing and installation of command-wide standard operating information systems as required.
- That USACSSEC be assigned technical support functions for information systems and ADP, to include software standards, generalized software, documentation standards, data elements and codes, DPI operating procedures, resource standards for design of operating information systems for multicommand use.
- That major command functional staff agencies be assigned the responsibility for formulation of detailed information requirements for the design of command-unique operating information systems, and for stating command requirements to be met in multicommand standard operating information systems.
- That systems design and computer programing for operating information systems which are unique to a specific command be accomplished centrally at highest practical level.

Another key concept in the approved SOMISS Plan was the establishment of a new Army command, the U.S. Army Computer Systems Command. The USACSC is responsible for software design, computer programing, and programing maintenance for standardizing information systems for multicommand use.

Initially being established as a Class II Activity, under the Army Assistant Vice Chief of Staff, the USACSC will be formed with the Automatic Data Field Systems Command (ADFSC) as the nucleus.

Other on-going systems, multicommand in nature (that is systems that cross command lines or systems that are used in more than one command), will be transferred to the jurisdiction of the USACSC.

An ad hoc USACSC Planning Group has responsibility for development of the time-phased plan for the establishment of the new command. This planning group has representation from the HQ DA staff agencies and from many Army commands. Three part-time work groups and one full-time task force from the Army commands and staff agencies are working on development of the plan.

Brig Gen Henry C. Schrader, Director of Management Information Systems (MISD), Office of the Assistant Vice Chief of Staff, is chairman of the ad hoc Planning Group charged with developing the over-all plan for the establishment of the USACSC.

Donald J. Gast, chief of the MISD Information Sciences Group, who chaired the SOMISS group established by Chief of Staff Memorandum 67–444 in November 1967, is deputy chairman and is also chairman of the Working Group on Missions and Functions. Lt Col William R. Svirsky heads the Working Group on the Systems Development Cycle and Command Relationships. Lt Col William J. Hilsman heads the Working Group on Projects and Resources.

The Special Task Force is headed by Col B. L. Smith, GS, special assistant to the commanding general, Technical Director's Office, Automatic Data Field Systems Command (AFDSC). Assistants are Brian J. McKiernan, computer systems analyst with Information Sciences Group, MISD, in the area of Projects and Resources and Brooks Ydeen, director, ADFSC Program Management Directorate, in the area of Organization and Facilities.

Additional agencies represented on the planning group are: Office, Deputy Chief of Staff for Operations (ODCSOPS), Col Robert T. Winfree, chief, Systems Development Branch, Command and Control Division; Office, Assistant Chief of Staff for Intelligence (ACSI), Lt Col Richard Koenig, chief, Systems Support Branch, Intelligence Handling Division; and

Assistant Chief of Staff for Force Development (ACSFOR), Lt Col L. F. Dixon, chief, Information and Data Systems Office; Lawrence Cohen, special assistant for management to the director of Plans Programs, Office of the Chief of Research and Development; Assistant Chief of Staff Communications-Electronics, Lt Col Bernard P. Matthey; and

Office of the Deputy Chief of Staff for Personnel (ODCSPER), Col William R. Dupart, chief, Plans and Development Division; Comptroller of the Army (COA), Col John A. Kjellstrom, assistant comptroller for Information Systems; Office of the Deputy Chief of Staff for Logistics, Lt Col John J. Wren, assistant deputy to the Counsel General; and

U.S. Army Materiel Command (USAMC), Louis C. Wiggins, chief, Programs Branch, Automatic Data Processing Techniques Division, Directorate of Management Systems and Data Automation; U.S. Army Combat Developments Command (USACDC), Col Joseph E. Halloran Jr., deputy comptroller, Office of the Comptroller; U.S. Continental Army Command (USCONARC), Michael Vogt, chief of Plans and Training.

Col A. E. Haines, director, Computer Systems Department, represents on a liaison basis the U.S. Army Strategic Communications Command at Fort Huachuca, Ariz.

The plan for the establishment of the new command, the USACSC, is to be completed in January 1969.

"The scope of the SOMISS Study is Army-wide," a spokesman stressed. "The Army will not arrive at the posture envisioned by SOMISS overnight. There is still a great deal of hard work to be accomplished. However, for the first time since the Army has been using the capabilities of the digital computer there is now a short-range and long-range plan for improving management information systems."

Memo Expands R&D Role Of Corps of Engineers

(*Continued from page 1*)

nautics and Space Administration, and other governmental agencies as required.

- Establishing requirements and performing research and development necessary to provide new construction design criteria, construction techniques, construction material, and facilities maintenance for the U.S. Army, U.S. Air Force, and other governmental agencies as required.
- Technical supervision of research and development of engineer techniques and equipment required for combat and combat service support.

The memorandum also prescribes all other aspects of the mission of the Corps of Engineers. Included are the Civil Works Program (currently funded at about $1.3 billion annually), all military construction, the Army Installation Master Planning Program, Army Real Estate Services, support to the Assistant Chief of Staff for Intelligence pertaining to mapping and geodetic activities, and responsibilities under the supervision of the Assistant Chief of Staff for Force Development, Deputy Chief of Staff for Military Operations, and Deputy Chief of Staff for Personnel.

Edgewood Arsenal Develops Automatic Alarm for Nerve Agents

Chemical field alarm XM8, in the final stages of development by scientists and engineers at Edgewood (Md.) Arsenal, will for the first time provide U.S. field forces with an automatic, portable means of detecting presence of odorless and colorless nerve agents.

Completion of this system will culminate 20 years of research and development effort and, in the opinion of those who have worked on the project, mark a major breakthrough in the field of chemical warefare defense.

The heart of the XM8 is an electro-chemical cell which continuously samples the air and in the presence of nerve agents produces electric energy that triggers the alarm. It will detect minute amounts of nerve agent vapor in below-hazardous concentrations, but will not respond to normal pollutants found in the air.

A detector unit, remote alarm, power source, detector refill kit, field test kit and vehicle mounting kit comprise the system.

Weighing less than 15 pounds, the unit measures about 16 inches high, 7.7 inches wide, 6.3 inches deep and is operable for at least 12 hours with its battery power-pack at 20° F. or about 96 hours at 70° F. Easily portable by a soldier, the alarm also can be vehicle mounted or used in fixed emplacements.

The principal contractor is the Bendix Corp., of Towson, Md., with major contributions being made by the Southern Research Institute, Birmingham, Ala.

The need for a detection alarm system was evident at the end of World War II with the discovery of stocks of highly toxic nerve agents in Germany. The need was compounded with the subsequent stockpiling of nerve agents by major world powers.

Prior to the development of the XM8 chemical agent alarm, the Army had various effective detection devices. Lacking, however, was an automatic system suitable for field use.

Previous efforts to field an automatic agent alarm resulted in development of several which were too large and complex to field. The XM8 is the first which will be adopted for general field use at platoon level.

The first developmental alarm was the M5, a 700-pound device employing approximately one gallon of solution per day. The next experimental portable unit was the E21 based on the readout of a colorometric tape, but it was not adopted because of excessive weight and maintenance.

XM8 Chemical Field Alarm

Another attempt to achieve the stringent characteristics specified for a field device resulted in the E41 alarm. Based on the same principle as the E21, it also was considered too heavy and not reliable enough for Army-wide use at platoon level.

The Department of the Army approved a follow-on development program in 1964 as an urgent DA Priority 1 project. The Vice Chief of Staff directed that the alarm weight be less than 20 pounds. In January 1965, the Army established an expedited development schedule to type classify a portable chemical agent alarm by the first quarter of FY 69.

The XM8, using the principle of spontaneous electrolysis, was selected as a back-up system to the XM9, an infrared adsorption device. When the infrared device developed basic technical difficulties, solution of which were determined to be beyond the state-of-the-art, the XM8 was selected to proceed to type classification.

Selection of the XM8 alarm was the culmination of efforts extending back to feasibility tests conducted in 1964. Several candidate principles, such as the hydrogen flame emission detector, infrared devices, colorometric tape readouts and spontaneous electrolysis, were evaluated.

Feasibility testing of the XM8 included approximately 5,000 hours of operation in temperature extremes as low as −40° and as high as +120° F. Other parameters such as shock and vibration capabilities were evaluated.

Subsequently the XM8 successfully completed 20,000 hours of engineering design testing and 45,000 hours of en-

Col Rafert Heads New USASASA at Aberdeen PG

Establishment of the U.S. Army Small Arms Systems Agency (USASASA) at Aberdeen (Md.) Proving Ground as a management group of highly qualified individuals was announced recently by General Frank S. Besson Jr., CG of the Army Materiel Command.

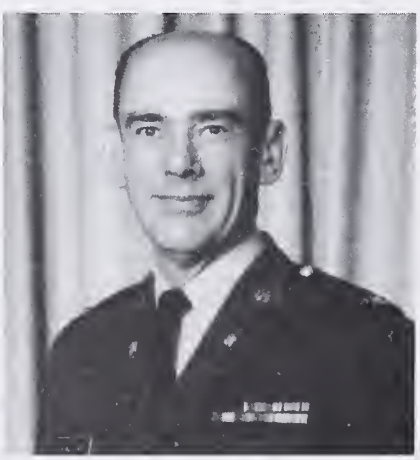
Col Walter E. Rafert, CO and director of the agency, will report directly to the CG of the AMC. Leonard Ambrosini is acting technical director. Until reassigned, Col Rafert was deputy director, Developments, Office of the Chief of R&D, HQ DA. Ambrosini was chief systems engineer, Army Weapons Command.

General Besson said USASASA will function as a clearinghouse and be concerned with identifying and exploiting technological resources within the Department of Defense and industry to meet requirements for development of small arms weaponry for the Infantryman in the 1970s.

Emphasis will be on innovative ideas and designs for rifles, pistols, shotguns, grenade launchers, machineguns, associated ammunition, mounts and sights, it was stated.

Through control of technical and financial resources, USASASA will integrate the existing individual weapons capabilities of the Army Weapons Command, Army Munitions Command and the recently established 5-laboratory complex of the Aberdeen R&D Center.

The new agency will have contractual authority as well as power to direct the integrated small arms systems activities of in-house research installations under AMC control. Upon completion of the development phases for new materiel, USASASA is expected to retain responsibility for items through the first production.



Col Walter E. Rafert

gineering and service tests at TECOM test sites. The system was evaluated in arctic, desert, intermediate and tropic environments.

The XM8 has been designed so that it is readily maintainable. Required servicing at 12-hour intervals is accomplished by one man in less than 5 minutes. The modular concept has been used to the maximum extent possible, permitting the operator to troubleshoot and replace the applicable molules at the using level. Neither servicing nor module replacement requires special skills or tools.

"Nice to have" but nonessential features were eliminated to avoid unnecessary technical complexity or over refinement which could have reduced the reliability of the system.

The detector can be used in various configurations depending upon the tactical situation. It can be used in stationary locations or be attached to specific type vehicles and use their electrical system.

The detector unit provides a low-level audio signal when low concentrations of the chemical agents are detected. A quiescent potential exists in the cell until a chemical agent causes an increase in the potential, amplified to trigger the audio alert.

The XM42E1 remote unit is combined with the chemical agent detector to provide, at a distance, audio-visual warning. It is connected by field wire to the detector, which may be as far away as 400 meters.

The refill kit contains operating material for 15 days of continuous operation. A BB501()/U rechargeable battery is used to operate the detector in ambient temperatures as low as —40°. A power supply converter changes 115/220 volt a.c.—50, 60 or 400 cps to a nominal 28 volt d.c. source. Standby battery operation precludes mission stoppage due to a power failure.

Vehicle mounting kits are adaptable to the ¼-ton truck (M151A1), the ¾-ton truck (M37B), the 2½-ton M35B1, the armored personnel carrier (M113A1), and the command post vehicle (M114).

Based on performance in the extensive engineering and service tests from November 1967 to the third quarter of FY 69, the Army Materiel Command (AMC) recommended Oct. 21, 1968, that the XM8 Chemical Agent Alarm System be type classified Standard–A for worldwide use. Classification is expected to be completed this month. Competitive procurement is planned for in FY 1970.

The first production line systems will be subjected to confirmatory tests by the U.S. Army Test and Evaluation Command to assure that all essential military requirements have been satisfied and that production units are acceptable for field use.

Simultaneously, new equipment training will be implemented and all necessary actions will be accomplished for Army Materiel Command release of the system to Army field units and other services for operational use.

Success of the XM8 development program is attributed to the team effort between the various elements of Edgewood Arsenal and industrial contractors. The arsenal's Defense Development and Engineering Laboratories, assisted by supporting directorates, coordinated value engineering, production analyses, product improvement, maintenance evaluation, quality assurance, design of inspection aid equipment, publication of manuals, and the preparation of a complete technical data package required for procurement.

John C. Young, project engineer, directed the team of arsenal scientists and engineers comprised of Philip A. Belli, design engineering; Max Kerschensteiner, commodity manager; John Renda, production engineer; Joseph Callahan, maintenance engineer; George Danielson, quality assurance engineer; and Paul Wagner, field test engineer.

The Defense Development and Engineering Laboratories are under direction of Lt Col Robert F. Franz Jr. Head of the Detection and Warning Laboratory is Frank Shanty.

Bernard Reich

ECOM Scientist Heads NATO Unit

North Atlantic Treaty Organization (NATO) Headquarters has announced appointment of Bernard Reich, a scientist of the U.S. Army Electronics Command at Fort Monmouth, N.J., to serve as chairman of a Special Working Group on Semiconductor Devices.

Approved by the Department of the Army, Reich's appointment makes him the successor to Harold Lewis of the United Kingdom. Reich has served as principal U.S. member of the NATO Working Group on Semiconductor Devices eight of nine years it has existed.

Currently assigned as chief of the Electronics Command Semiconductor Devices Branch, Solid State and Frequency Control Division, Reich has written the majority of his more than 50 published technical articles on R&D of semiconductors.

SATCOM Delivers Terminals to 4 NATO Members

Delivery of four U.S. Army mobile satellite communications terminals to Belgium, Canada and Italy under the cooperative U.S. NATO experimental program for tactical satellite communications (TACSATCOM) was announced this past month.

Formalized by a Memorandum of Understanding in November 1967, the TACSATCOM program involves eight NATO members—Belgium, Canada, Federal Republic of Germany, Italy, The Netherlands, Norway, United Kingdom and United States—and the SHAPE Technical Center.

The Army is assigned United States lead service responsibility in this venture, with the Army Satellite Communications Agency acting as field agent.

The ¾-ton truck-mounted shelter terminals, two for Canada and one each for Belgium and Italy, were designed by the SATCOM Agency and fabricated under agency direction by the Army Blue Grass Depot in Lexington, Ky. They are similar to the Experimental Army Satellite Tactical Terminals (EASTT), constructed by the SATCOM Agency for operation with the Air Force LES–5 satellite launched from Cape Kennedy in 1967.

Included in the NATO TACSATCOM test network are small ground-based, seaborne and airborne terminals, built in-country by the program participants, for the technical evaluation of tactical satellite communications as a modern and dependable communications tool for the field forces of the NATO nations.

SATCOM Truck-Mounted Terminal

AR 70-35 Prescribes Procedures, Responsibilities for 5 Programs

Policies, procedures and responsibilities of major agencies concerned with Qualitative Requirements Information, the Military Themes Program, Unfunded Study Program, and Advanced Planning Briefings are detailed in Army Regulation 70–35.

Several briefings have been given in recent weeks to acquaint representatives of the implementing agencies with changes in a regulation that "for the first time, wraps into one package all segments of the Army R&D information programs and attempts to couple the Army's needs to the R&D capabilities in the outside world."

Providing for "several major advances" in procedures, AR 70–35 is of interest to industrial, nonprofit, educational and research organizations considered to have a "proper place in the marshalling of R&D resources to meet Department of the Army needs."

Objectives are:

- To encourage assistance from private qualified civilian organizations, including industrial, educational, research and nonprofit institutions or corporations in solving problems which are offered in the form of Qualitative Requirements Information, Military Themes or suggested as an Unfunded Study Program.
- To encourage the participation of industry in Army-oriented R&D under the Armed Services Procurement Regulation 15 Contractor's Independent R&D Program; and for industrial, educational, research and nonprofit organizations to become better informed and more responsive to Department of the Army needs.

Chief of Research and Development Lt Gen Austin W. Betts is responsible for general staff supervision of the over-all program of Advanced Planning Information for R&D. Segments of the program are assigned to specific major commands and agencies.

AR 70–35 raises the Qualitative Requirements Information (QRI), formerly the Qualitative Developments Requirements Information (QDRI), to the level of an Army-wide program. It expands the effort to include applied research as well as development. Basic research is covered in the Military Themes Program.

Further, the AR directs that all Department of the Army agencies having a research, development, test and evaluation (RDT&E) mission will participate and designate a QRI control office as well as a QRI manager.

QRI Program objectives are designed basically to implement the Army's policy on scientific and technical information by pursuing vigorous, well-organized, thoroughly coordinated, comprehensive R&D information exchange programs; and to provide for maximum interchange of technical information between the Army and the scientific, academic and industrial community to the maximum extent permitted by security safeguards.

Each QRI manager is responsible for deciding how to employ installation personnel in the qualification process. Qualifying agencies must register in the AMC master data bank all organizations determined to be qualified to participate in their installation QRI program.

The Army Materiel Command is designated the major proponent command for establishing Army-wide procedures to implement the QRI Program. Developing agencies are required to comply with AMC procedures, including DA Pamphlet 70–20.

Shelter Tested for Protection Against CB Agents

Protection against chemical and biological agents for 10 persons can be provided by a portable, multipurpose field shelter delivered recently to the U.S. Army in prototype form and tested at four R&D installations.

Edgewood (Md.) Arsenal scientists and engineers in the Defense Development and Engineering Laboratories have been developing the XM51 Collective Protective Shelter System (CB Pressurized Pod) under contract with the American Air Filter Co., St. Louis, Mo.

Usable as a command post, communications center, medical air station or an air operations center, the inflatable-type structure has 210 square feet of interior space. Shaped like a quonset hut, the shelter is made of Tedlar laminated to Neoprene-coated Dacron. Filtered air is used to inflate the 15-inch-diameter tube-like supporting ribs.

Edgewood officials said the shelter also will provide combat troops who have been wearing protective masks or clothing for extended periods in contaminated areas with a toxic-free area to eat, shave, relax or perform assigned duties.

The 2,400-pound unit can be mounted on a trailer or transported by conventional aircraft and parachuted to remote sites. It can be unpacked and put into operation by four men in about 20 minutes. The system is designed to operate 500 hours with only routine maintenance.

Additional units may be attached together end-to-end to provide a larger protected area. A collapsible inflatable air lock attached to one end of the shelter provides contamination-free entrance and exit. Conditioned air inside the shelter and air lock is pressurized higher than the outside air to prevent infiltration of contaminants.

Five major components comprise the system: shelter and air lock; gas and particulate unit; environmental control (heating and cooling) unit; 20-hp standard military gasoline engine; and a standard military 1½-ton 2-wheel cargo trailer (M105A2). A 50-gallon gasoline tank provides fuel for 24 hours of operation.

The four prototype systems delivered to date have been rigidly tested at Edgewood Arsenal, Deseret (Utah) Test Center, Eglin (Fla.) Air Force Base, Yuma (Ariz.) Proving Ground, and the U.S. Army Natick (Mass.) Laboratories.

The U.S. Army Test and Evaluation Command is awaiting delivery of 15 more prototype units for engineering and service tests at Fort Knox, Ky., the Arctic Test Center in Alaska, Tropic Test Center in the Panama Canal Zone, Deseret Test Center and Yuma Proving Gound.

MULTIPURPOSE field shelter for protection against CB agents

The CG of the AMC is responsible for:

- Preparing all QRI problems pertaining to the AMC mission.
- Publishing and distributing all QRI Problems Guides.
- Soliciting and including in a QRI volume the problems of the AMC, the Chief of Engineers, the U.S. Army Security Agency, Office of The Surgeon General, and other developing agencies as deemed appropriate.
- Establishing a QRI numbering system based on the Department of Defense Program Element System.
- Establishing and maintaining an automated master register of organizations qualified to receive QRI problems and responses.
- Obtaining and submitting to the Office of the Chief of R&D an annual report from all agencies participating in the QRI Program, to reflect participation, progress and contractual actions.
- Coordinating interfaces of the QRI Program with all other Army R&D information programs.

AR 70–35 assigns to the Chief of Engineers, the U.S. Army Security Agency, Office of The Surgeon General, and any other participating developing agencies the responsibility for formulation and preparation of QRI statements in their areas of responsibility. These statements will be submitted for publication in an appropriate QRI Volume.

The Chief of Research and Development, Department of the Army, is responsible for the Army Military Themes Program, which has been conducted by the basic research community for many years. AR 70–35, however, fixes polices and required procedures for the first time. Objectives of the program are to:

- Provide a framework within which to conduct basic research on those problem areas, of urgent, widespread interest to the Army, and which exist because of a lack of understanding of fundamental knowledge.
- Secure optimum exchange of information between the Army and other government and nongovernment organizations on basic research problems.
- Keep other organizations informed of Army requirements for concerted basic research efforts.
- Provide recommended research areas for industry participation under provisions of ASPR 15, Contractors Independent R&D Program.

Developing agencies are responsible for formulating and submitting to the Chief of R&D suitable problem areas for inclusion in the Military Themes Program and for monitoring the progress of work as requested by the Chief of R&D. The Army Research Office-Durham (N.C.) is responsible for everyday operations of the program, including funding, monitoring, and publication of a brochure explaining the goals and procedures.

The purpose of the R&D Unfunded Study Program as set forth in AR 70–35 is "to assist civilian organizations to conduct R&D studies which they initiate and conduct at their own expense." Fairly successful over the years, this program provides a source of R&D related to Army problems but still not funded by the Army.

The natural question is, "What's in it for the contractor?" His research gamble may pay off when he comes up with something sufficiently worthwhile to the Army to warrant funding from that point on in the hope of obtaining a useful military product.

The Chief of R&D is responsible for coordinating and acting on Unfunded Studies referred to HQ DA for decision or guidance. Developing agencies, as directed by HQ DA, in their assigned areas, publish implementing instructions and guidance to civilian organizations in guides and brochures; also, they obtain agreements concerning release of DA documents and information, and approve the study requests.

HQ AMC maintains a master central office file of all approved Unfunded Study requests for ready accessibility to interested agencies having a demonstrated need-to-know.

With respect to Advanced Planning Briefings, AR 70–35 provides for their expansion to include not only industry, as previously, but university, research and nonprofit organizations as well. Objectives, basically, are to provide by means of formal briefings current, factual and definitive information on Army RDT&E agencies' mid- and long-range plans, policies and programs. The goal is to facilitate mutually profitable exchange of information with industrial, research and educational units.

Advanced Planning Briefings may be initiated by any Department of the Army command or agency when coordinated through the Chief of R&D to insure awareness of the Department of Defense and other Armed Services.

Briefings may be cosponsored by other agencies within the DoD or by representatives of other governmental, private or industrial agencies, or professional societies.

The briefings are prepared to provide a clear, concise presentation of Army needs and the scientific and technological advances required to meet future Army requirements at the least cost and in the most efficient manner. They are directed to long-range planners and R&D personnel rather than to administrative or sales personnel.

Invitations to attend Advanced Planning Briefings may be extended to Canada and the United Kingdom as well as to United States organizations when coordinated through the Technical and Industrial Liaison Office of the Chief of R&D, DA.

GERMAN SCIENTISTS recently visited U.S. Army installations under a Mutual Weapons Development Data Exchange Agreement between the U.S. and Federal Republic of Germany (FRG). Carol F. Schneider (left), U.S. Army Weapons Command (WECOM) Artillery Systems Laboratory chief, explains 155 mm howitzer loading mechanism at Rock Island (Ill.) Arsenal. Shown (l. to r.) are R. R. Rekittke, Dr. Osberin Hornfeck, diplomat Ing Heede, Dr. Ing Kratz, and R. R. Seehaus. At right (rear) is Carroll Dalton, chief, WECOM Prototype Shop. The FRG delegation also visited Yuma (Ariz.) and Aberdeen (Md.) Proving Grounds and Watervliet (N.Y.) and Picatinny (N.J.) Arsenals.

40-Year Saga of Antarctic Explorer Ends

Splendid sagas usually are fictional, a part of the treasured folklore of a nation, but Dr. Paul Allman Siple lived his saga as an internationally famous polar explorer, scientist, inventor, author and pioneer in Army R&D right up to his death Nov. 25.

Dr. Siple was stricken by a heart attack while at work in the Army Research Office, Arlington, Va., where he was employed as special scientific adviser to the Director of Army Research, Office of the Chief of Research and Development. He would have been 60 years old Dec. 18.

Only those who worked with him, other than his wife, Ruth, and other immediate members of the family, could appreciate and unforgettably respect the magnitude of his unconquerable spirit—demonstrated not so much by his many polar explorations as by his life since June 6, 1966.

On that date he was in Wellington, New Zealand, where he had participated in a meeting as scientific attache of the U.S. State Department for Australia and New Zealand. "Suddenly," he later told friends, "I felt as if I wanted to sit down on the floor. And when I did, I just couldn't move."

From that partial paralytic stroke he never fully recovered. More than a month later he was moved to Canberra, Australia, after responding favorably to therapy. Returned to the United States in September, he made continued progress and in January 1967 resumed his duties with the Army Research Office after a 3½-year leave of absence.

Dr. Paul Allman Siple

Up to the time of his death he moved about slowly, painfully with his left arm in a sling and his right hand grasping a 4-legged crutch. But his determination to overcome his difficulties, his will to continue to make a notable contribution to Army research and development as a scientific adviser with a great depth of knowledge, never failed—nor did his famous smile and the ready humor that endeared him to friends throughout the world.

Two cups of coffee at the corner of his desk, both with the snack bar covers firmly fixed, bore mute testimony to the sudden termination of a 40-year career as an explorer and scientist that carried him to all seven continents and nearly every major island land mass.

That career began as a 19-year-old dogsled driver, biologist and naturalist when he was selected from more than 60,000 Boy Scouts to go on the first expedition of the late Admiral Richard E. Byrd to the Antarctic (1928–30). Dr. Siple spent four winters and 10 summers in Antarctica. —a longer time than credited to any other man.

During World War II he served four years with the Office of the Quartermaster General, Department of the Army, and was discharged in 1946 as a lieutenant colonel. Except for the leave of absence to serve with the U.S. State Department, he was an Army civilian scientist continuously from 1946 until he died.

Dr. Siple was chief biologist and field party leader with the Second Byrd Expedition to Antartica (1933–35) and was deputy to Admiral Byrd and officer-in-charge of the U.S. Antarctic Program (1955–57). He was scientific leader in the initial year of operation of the U.S. International Geophysical Year Geographical (Amundsen-Scott) South Pole Station.

With the U.S. Antarctic Service Expedition (1939–41), he was senior geographer, technical supervisor of

AMS Prepares Moon Model of Astronaut Landing Site

Simulated landings of astronauts on the moon will be made as realistic as possible, with respect to the terrain they are expected to encounter, by use of a huge high-fidelity lunar relief map prepared by the U.S. Army Map Service, an agency of the Corps of Engineers.

Nearing completion as this edition of the *Army Research and Development Newsmagazine* went to press, the 22 by 14-foot "hand-carved" model of the landing site astronaut trainees will see as they "approach" the "target area" is a part of the Lunar Module Simulator (LMS).

Faithfully reproduced from Orbiter IV and V photography provided by the National Aeronautics and Space Administration, the map reflects the capabilities of highly skilled technicians in the Relief Model Branch of the Army Map Service (AMS).

The LMS will be installed in the Kennedy Space Center to provide flight crew training and orientation on the Apollo landing site designated as II–P–8. Astronauts will experience a lunar landing approach without leaving Florida through use of the LMS, including the crew station, optics, instructor console, computer complex, closed-circuit TV and other equipment.

An integral part of the system is the Land and Ascent (L&A) Section, which is physically separated from the other parts. The L&A will provide appropriate views of the simulated lunar surface on a TV screen. This will simulate the crew station window in the mockup of the space vehicle.

Encompassing 291 square feet on 10 panels, faultlessly joined and rounded off on the west side to represent the horizon, the surface model will give trainees a broad range of "approach" in altitude, vehicle attitude and lighting. The model will have a hypothetical ellipse surrounding the touchdown point or "landing footprint" about four by two nautical miles.

Shaped accurately into the model will be about 500,000 lunar craters, some as small as 5 meters across. Rocks, rock-strewn field and all categories of anticipated lunar surface features and characteristics will be shown. Lunar objects down to 50 scale feet will be precisely mapped and smaller ones down to 3 feet will be spotted.

Another requirement to tax ingenuity of the model-makers was precise attachment to a gantry to suspend it upside down for exposure to the upward-looking TV camera. Further, total model weight could not exceed 1,000 pounds; also, the epoxy resin material must be warp- and scorch-proof to withstand high-intensity heat generated by the lighting system.

NASA presented specifications to the AMS in June, making the time limitation for delivery of the completed surface model "extremely tight." AMS technicians were selected for the job in recognition of the work they did in constructing the lunar surface for the United States exhibit at EXPO–67 in Canada.

Involvement of AMS technicians in the man-on-the-moon program is more than a routine assignment. Each one is highly absorbed in the part he is playing—in previewing what astronauts are expected to see in the 1970s.

logistics and navigator. Following his discharge from the Army, he was military geographer to the U.S. Army General Staff until 1953, followed by a year as director of Army basic science research. In 1955 he was director of scientific projects on the U.S. Navy's Operation Deep Freeze in Antarctica.

Time Magazine carried Dr. Siple's picture on its front cover Dec. 31, 1956, in recognition of his service to the U.S. Antarctic IGY Program, and devoted a feature-length article to his polar explorations. Upon his return to the U.S., Dr. Siple joined the staff that was to become part of the Directorate of Army Research in March 1958.

Experiences with the 1928–30 Byrd Expedition were chronicled by Dr. Siple in his first book, *A Boy Scout with Byrd*, followed by *Exploring at Home*, *From Scout to Explorer*, and 90° *South* (the latter published in 1959). He also authored numerous articles in scientific and professional journals.

In 1960 Dr. Siple gave to two Boy Scouts, carefully selected for their scientific career potential, an opportunity such as he had with Byrd by persuading the Army to let them spend several weeks as junior scientific assistants at Camp Century, the U.S. Army's former "City Under the Ice" research center in Greenland. He then stated:

"I think that all civilian scientific organizations should set up similar opportunities for youths. Our bright youngsters intent on careers in science need to get their feet wet in practical scientific work before they finish their schooling—as I did with the Byrd Expedition. It is vital to the Nation's future that young people's interest in science be stimulated through real field work of this kind."

In lectures in many nations Dr. Siple reemphasized his support of efforts to interest young people in scientific careers. He was a prime mover in encouraging the U.S. Army support of junior science fairs. For many years he headed the Army's support of the International Science Fair sponsored by Science Service, and also was active in the Army's Junior Science and Humanities Symposia (JSHS) nationwide program.

One of his solid achievements in adult science was that of laying the foundation for establishment of the U.S. Army Research and Development Office in Melbourne, Australia. in August 1962. He had spent four months in 1961 in New Zealand, Australia and India under the U.S. State Department American Specialist Program. Upon his return he strongly advocated strengthening scientific ties with these nations.

Listed in the *International Who's Who*, Dr. Siple was presented his seventh honorary Doctor of Science or LLB degree by Kent (Ohio) State University in May 1968. In May, also, he received the 1968 Helen Culver Gold Medal Award of the Geographic Society of Chicago.

The Culver award joined him with such other famous polar explorer recipients as Roald Amundsen, the first winner when the award was established in 1907, Sir Ernest Shackleton (1910), Robert E. Scott (1914), Vilhjamur Steffanson (1919) and Admiral Byrd (1926). The medal had not been presented since 1959.

Numerous other honors came to Dr. Siple from the U.S. Congress (three Byrd Antarctic Expedition Medals) and many nations in tribute to his scientific explorations. The U.S. Army honored him with its two highest awards for Civil Service employes, the Decoration for Exceptional Civilian Service and the Distinguished Civilian Service Medal. Among his most treasured awards were those conferred by the Royal Geographic Society of the United Kingdom and the Royal Danish Geographic Society.

Recognition among such famous scientists as Elmer A. Sperry, Enrico Fermi, John P. Hagen, Robert Hutchings Goddard and George Washington Carver honored Dr. Siple in 1962. Edna Yost listed him with 13 illustrious men in *Modern Americans in Science and Technology* in the "Makers of Our Modern World" series.

Born in 1908 in Montpelier, Ohio, Dr. Siple spent his teen-age years in Erie, Pa., and was married to Ruth I. Johannesmeyer of Meadville, Pa., in December 1936. Their marriage was blessed by three daughters, all of whom married in recent years—Mrs. Jeffrey Remington, El Paso, Tex., Mrs. Michael H. Johnson, Monroe, Wis., and Mrs. Jane P. Wertime, now residing with her mother at 3454 North Edison Street, Arlington, Va. Other survivors are his mother, Mrs. Fannie H. Siple, and a sister, Mrs. Carrol L. Kettering, both of Canton, Ohio.

After completing undergraduate work for BS and MS degrees at Alleghany College, Dr. Siple attended Clark University to earn a PhD degree in the field of geography. Among his professional affiliations were the Association of American Geographers (vice president, then president in 1959–60) and fellowship the American Geographical Society.

DEFINITION OF PURE SCIENCE

"Pure science is not technology, not gadgetry, not some mysterious cult, not a great mechanical monster. Science is an adventure of the human spirit; it is an essentially artistic enterprise, stimulated largely by curiosity, severed largely by disciplined imagination, and based largely on faith in the reasonableness, order, and beauty of the universe of which man is a part."

From *Goals for Americans* by Warren Weaver.

WECOM Uses Reverse Recoil in Artillery Research

Firing-Out-Of-Battery (FOOB), a new idea in recoil mechanism, is one of the most promising artillery applied research projects being developed at the U.S. Army Weapons Command (WECOM), Rock Island, Ill.

Design engineers in the Research and Engineering Directorate believe the reverse recoil cycle—moving the gun tube forward prior to firing—offers a potential reduction in weight and over-all weapon length, an increase in rate of fire, improved stability, and reduced emplacement and displacement time.

The increased rate of fire is possible due to the reduced cycle time. Maneuverability and transportability are improved by the reduced length and weight of the weapon.

In FOOB operations, an accelerating force is applied to the recoiling parts in the direction of firing. When a predetermined forward velocity is attained, firing is initiated and the recoiling parts reverse direction and return to the starting position.

Among technical problems hindering developers of the FOOB soft-recoil system is the variation in time required for the propellant to begin burning before firing occurs; also, new devices to hold recoiling parts prior to release and new controls required within the recoil system.

Early tests were made with the 105mm FOOB fixture. Engineers are now exploring the possibility of applying the concept to larger-caliber weapons.

AVCOM Undergoes Name Change in Reorganization

Redesignated the Army Aviation Systems Command (AVSCOM), the former Army Aviation Materiel Command (AVCOM) is undergoing a reorganization intended to make it the Army's model systems management command.

Commanded by Maj Gen John Norton, AVSCOM is responsible for research, development, test, evaluation, procurement and maintenance activities programed at about $2 billion annually.

Based on a study initiated in September 1967, with Wendell E. Maulding in charge as his special assistant, General Norton has separated the technical operations from staff and supporting elements in the organization changes now taking place.

Major benefits of the realignment, it was stated, are expected to include improved aircraft support of combat forces, more efficient research, development and procurement of aviation materiel, and management systems utilizing advanced technology.

AVSCOM is headquartered in St. Louis, Mo., in the Mart Building at 12th and Spruce Streets. About 4,000 of AVSCOM's 10,000 military and civilian personnel comprise the headquarters staff, with the remainder at six subordinate field activities.

AVSCOM also has technical representatives in the U.S. and overseas.

Maximum responsiveness to the ever-increasing requirements of field armies is a primary objective of the reorganization. Since 1958 the total of Army aircraft, has increased from about 5,000 to well over 10,000. About 5,000 U.S. Army aircraft are engaged in overseas activity.

Contributing to the need for realignment at AVSCOM operations, it was explained, is the rising cost of procurement and maintenance of aircraft, a fact that demands the most efficient methods of management to meet operational requirements with available resources.

Changes instituted by General Norton "will provide a greater capability for intensive management of Army aircraft systems throughout their life span," it was stated.

Brig Gen John P. Traylor, deputy CG and chief of staff, has responsibility for personnel, comptroller, automatic data processing, legal and facilities management and other supporting functions.

Col Harry L. Bush is the deputy commander for Research, Engineering and Data, with the additional duty of commanding the AVSCOM Research, Engineering and Data Activity (REDA). REDA is responsible for research at the Aviation Materiel Laboratories, Fort Eustis, Va., flight testing at the Aviation Systems Test Activity, Edwards AFB, Fla., and for engineering support for aircraft.

Col Clifton O. Duty, deputy CO for Acquisition, also is commanding the AVSCOM Acquisition Activity. This installation is responsible for procurement and production of aircraft, engines, repair parts and services, and for assuring that quality standards established for equipment are met.

The Acquisition Activity is responsible for contract administration at plants of the Bell Helicopter Co., Fort Worth, Tex.; Hughes Tool Co., Aircraft Division, Culver City, Calif.; Lockheed-California Co., Van Nuys.

Deputy commander for Logistics Support is one of Col Delbert L. Bristol's titles. The other is commander, AVSCOM Logistics Support Activity. He is responsible for logistical support of Army aircraft in the field, including repair parts, maintenance assistance, technical manuals and for determining requirements to support future operations.

The Logistics Support Activity is responsible for operation of the Aeronautical Depot Maintenance Center, Corpus Christi, Tex., which maintains and overhauls turbine engines and all types of Army aircraft.

JSHS Advisory Council Adds 2 University Professors

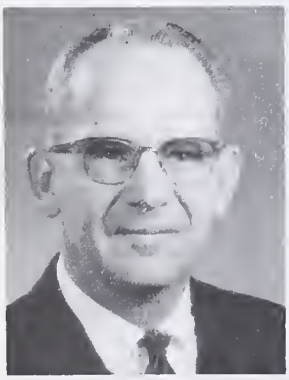
Appointment of two additional members to the U.S. Army Junior Science and Humanities Symposium (JSHS) Advisory Council was approved recently by Assistant Secretary of Defense (Administration) Solis Horwitz.

Dr. Donald D. Bode, research professor at the University of Iowa, will serve for a 2-year term. Dr. Thomas R. Porter, professor of science education at the University of Iowa, is appointed until June 30, 1969. They were selected to give regional directors continuing representation on the 13-member Advisory Council.

Created in 1961, the council provides guidance and other assistance in the conduct of the nationwide Army Junior Science and Humanities Symposium Program. About 25 regional symposia, representative of the winners of high school science fairs throughout the United States, culminate each year in a national JSHS.

Advisory Council members serve without reimbursement for time and travel. They work in cooperation with other representatives of the Office of the Chief of Research and Development, HQ Department of the Army, and industrial academic leaders in promoting the JSHS Program.

Dr. Donald D. Bode



Dr. Thomas R. Porter

Originated by the U.S. Army Research Office—Durham (N.C.), the JSHS Program is sponsored by the Chief of Research and Development. Each year since it was initiated the program has been gaining support from industrialists and educators.

DR. BODE retired with the rank of colonel after serving with the U.S. Army Chemical Corps from 1941 to 1962, and for six years prior was an assistant professor and then professor at the University of Tampa, Fla. He has a BS degree from Southwestern University (Memphis, Tenn.) and MS and PhD degrees from the U. of Virginia.

Since he has terminated his Army career, Dr. Bode has conducted research in ecology and epizoology at the University of Utah. His experience for duty on the JSHS Advisory Council includes six years of directing the Intermountain JSHS Program.

DR. PORTER has been on the faculty at the University of Iowa since 1957, serving nine years as associate professor of science and education until promoted to full professor and department head in 1966.

From 1953 to 1957, he was an associate professor of nature education at Pennsylvania State University, following 15 years at City College in San Francisco, Calif., as an instructor in biology and botany. He earned BS and MS degrees in botany from the University of Nebraska and a PhD from the University of California.

5 Laboratories Consolidated in Aberdeen R&D Center

Consolidation of five laboratory installations into a redesignated Aberdeen (Md.) Research and Development Center was announced by the U.S. Army Materiel Command in November as part of a long-range centralization of research goals.

Affected by this latest streamlining of AMC laboratory facilities are the former Ballistic Research Laboratories (BRL), Human Engineering Laboratories (HEL), Coating and Chemical Laboratory (CCL), Nuclear Defense Laboratory (NDL) and Army Materiel Systems Analysis Agency (AMSAA).

AMSAA is a new laboratory that replaced the Weapons Systems Agency of BRL and is charged with planning and conducting broad programs of materiel-oriented systems analyses.

All of the laboratories comprising the new center are physically located at Aberdeen Proving Ground, also the headquarters of the U.S. Army Test and Evaluation Command (TECOM), except the NDL at nearby Edgewood (Md.) Arsenal. The centralization is part of a Department of Defense-approved 10-year AMC facilities plan.

Consolidation of the five laboratories reduces the number of AMC central, in-house laboratories/centers from nine to six. Individual missions of the laboratories concerned will not change, the AMC announced.

BRL will still be responsible for conducting basic and applied research in weapons technology, ballistics and weapon systems evaluation.

HEL will continue to perform basic and applied research in the life sciences, involving human factors of capabilities and limitations, and human factors engineering applications in design of Army materiel.

NDL is still charged with research on nuclear weapons effects in areas of radiation, fallout, shielding and thermal radiation, health physics, and radioactive waste disposal.

The CCL will perform basic and applied research on automotive chemicals, coatings, cleaners, fuels, lubricants and related materials.

Col John C. Raaen Jr., former commander of BRL, HEL and CCL, is now commander of the Aberdeen Research and Development Center. Each of the five laboratories will have a technical director reporting directly to the commander of the center. No reduction-in-force is involved in the change, the AMC announced.

Among the listed advantages of establishment of the center are a better administrative program and joint use of model shops, machine shops, the calibration shop and the computing laboratory.

The organizational realignment was the third major change effected by the Army Materiel Command within about four months. In July, the Army Materials and Mechanics Research Center was set up at Watertown, Mass., to supplant the former Army Materials Research Agency. AMMRC now performs almost all of the AMC materials research activities.

In July, also, the Cold Regions Research and Engineering Laboratory at Hanover, N.H., was redesignated the Terrestrial Sciences Center, with an expansion of responsibilities.

DCA Defines System Engineering Facility Mission

System engineering for the over-all Defense Communications System is the function of the newly established System Engineering Facility of the Defense Communications Agency.

The DCASEF operates as a field activity under command of Lt Gen Richard P. Klocko, U.S. Air Force, director of the Defense Communications Agency, who announced appointment of Capt William T. Peale, U.S. Navy, as chief of DCASEF.

Initially the DCASEF will have a staff of about 40 military and civilian personnel, located temporarily at DCA headquarters in Arlington, Va., pending decision on a permanent site in the Washington, D.C., area.

The DCASEF will provide a complete facility for DCS system engineering and the equipment and instrumentation for test and evaluation activity. Responsibility will encompass the automatic switched networks, transmission subsystem and the operational direction facilities.

In working on evolutionary development of the DCS into a single integrated system, the DCASEF will be concerned with support and testing of telecommunications projects; also, for development and validation of computer programs for DCS operation and control.

To enhance the interrelationship between system and subsystem engineering, the DCASEF and Defense Communications Engineering Office will be collocated in a permanent site.

In DCASEF operations, switches of the Automatic Voice Network (AUTOVON) and the Automatic Digital Network (AUTODIN) will be tied into the Defense Communications System only for test purposes. The same will be true of the Automatic Secure Voice Communications (AUTOSEVCOM and Defense Special Security Communications System (DSSCS) in the future.

Established following endorsement by the Joint Chiefs of Staff and approval by the Deputy Secretary of Defense, the DCASEF will have an annual budget of about $2.5 million.

NASA Scientist Selected Director of Limited War Lab

An extended search for a successor to Dr. Edward K. Kaprelian as technical director of the U.S. Army Limited War Laboratory at Aberdeen Proving Ground, Md., ended with selection of Dr. Russell D. Shelton.

Dr. Kaprelian resigned effective Dec. 31, 1967. Dr. Shelton reported to fill the vacancy Nov. 15, 1968, after serving as chief of the Nuclear and Plasma Physics Division, Space Sciences Laboratory, National Aeronautics and Space Administration.

With NASA, Dr. Shelton was responsible for activities in the areas of ion, plasma, nuclear and radiation physics, cryogenics, seismology, planetology, soil mechanics and applied mathematics. He was concerned with such space science programs as ARGUS, VELA HOTEL, and PEGASUS.

Graduated from Eastern Kentucky University, Dr. Shelton earned an MS degree in physics (1950) and PhD in physics (1953) from the University of Tennessee. He taught courses in physics, nuclear engineering, analytical dynamics and space propulsion technology at Eastern Kentucky State College, University of Tennessee, Texas Christian University, Washington University, Illinois Institute of Technology and the University of Alabama.

Dr. Russell D. Shelton

Dr. Shelton served as senior nuclear engineer with General Dynamics from 1953 until he became executive physicist and head of the Physics Department for the Admiral Corp. in Chicago in 1955.

His academic and professional affiliations include Sigma Xi, the American Physical Society and the American Institute of Aeronautics and Astronautics.

Major RDT&E, Procurement Contracts Total Over Billion Dollars

Research, development, test and evaluation, and procurement contracts, each in excess of $1 million, totaled $1,281,226,449 from Oct. 9 through Nov. 8, with ammunition procurement accounting for most of this amount.

Uniroyal, Inc., received a $126,842,519 modification contract for manufacture of explosives, production of 105mm and 8-inch projectiles, and support services. Day and Zimmerman, Inc., was issued a $99,219,021 contract for ammunition items. Federal Cartridge Corp. gained a $95,143,563 modification contract for small arms ammunition and support services.

Remington Arms, Inc., will receive $82,887,419 for small arms ammunition and support services. Two modifications totaling $65,914,679 with Mason and Hanger-Silas Mason Co., Inc., are for bombs and mines, other ammunition items and support services.

Harvey Aluminum Sales, Inc., received a contract modification of $73,725,632 for ammunition and components and for support and maintenance services. Hercules, Inc., will be paid $62,110,732 on two contract modifications for propellants and explosives, and a contract for electrical blasting caps.

Thiokol Chemical Corp. was issued a $64,044,046 contract for ammunition igniters, flares and related components. Olin Mathieson Chemical Corp.'s two contract modifications totaled $61,841,968 for propellants, bags and related components.

Six contracts totaling $51,882,665 with Chamberlain Manufacturing Corp. ordered cartridge cases and projectile parts. General Motors Corp. will receive $41,025,032 in four contracts for the M551 armored airborne reconnaissance and assault vehicle engineering services, Main Battle Tank (MBT–70) engineering design services, CD850–6A transmission assemblies, and for 105mm projectile parts.

Sperry Rand Corp. gained $39,700,553 in modifications to contracts for ammunition and for compass set component parts. Philco-Ford Corp. was awarded two contracts totaling $32,579,500 for Shillelagh missile engineering services, Chaparral missile fire units, and weapon system test equipment.

Holston Defense Corp. Division of Eastman Kodak Co. was issued a $25,126,269 modification for explosives and support services. Martin Marietta Corp.'s two contracts totaling $20,434,421 call for modification kits for Pershing weapons system ground equipment, and engineering services.

Norris Industries, Inc., won $16,205,040 in three contracts for 90mm cartridge cases, motor tubes for 2.75-inch rocket motors, and metal parts for 175mm projectiles. Two contracts for $15,990,720 with General Electric Co. are for anti-jam improvement kits for the Hercules weapons system and 20mm artillery guns.

Hughes Aircraft Co. was issued $12,703,612 in contracts for AN/PRC–74B radio sets and for TOW guided missile system engineering services. Colt's, Inc., is furnishing magazine assemblies and repair parts for the M–16 rifle under two contracts totaling $12,002,839.

U.S. Steel Corp. received an $11,875,000 contract for 8-inch projectiles parts and Firestone Tire and Rubber Co. won a $11,617,036 modification for ammunition items and support services.

Hamilton Watch Co. was issued $10,848,195 for fuzes. Contracts of $10,803,708 and $10,584,000 went to Muncie Gear Works, Inc., and HITCO, Denver, Colo., respectively, for 2.75-inch rocket fin and nozzle assemblies. Thiokol Chemical Corp. received $10,305,708 in two contracts for CS–1 and CS–2 riot-control agents.

Contracts under $10 million. Hoffman Electronics Corp., El Monte, Calif., $9,055,000 for 2.75-inch rocket fin and nozzle assemblies; Z. D. Products, $8,370,641 for 7.62mm ammunition links, parts for artillery fuze delay plungers and 20mm projectiles; J. R. Hollingsworth Co., Phoenixville, Pa., $8,120,161 for generator sets; and

Brunswick Corp., $7,437,962 for smoke grenades, 155mm projectile grommets and bomb dispensers; Jackson Products Co., Tampa, Fla., $7,176,000 for 2.75-inch rocket fin and nozzle assemblies; Bell Helicopter Co., $7,161,671 definitization for UH–1H helicopters; Aluminum Corp. of America, $5,824,350 for motor tubes for 2.75-inch rocket motors; Hercules Engine, Inc., $5,603,967 for engine assemblies; Bulova Watch Co., $5,518,276 for MT M565 fuzes; and Bell Aerospace Corp., $5,176,000 for AH–1G helicopters and modification kits.

Contracts under $5 million. Amron Corp., $4,796,511 (three contracts) for cartridge cases and projectiles parts; Harvey Aluminum, Inc., $4,078,341 (two contracts) for cartridge cases and projectiles parts; S. Tepfer and Sons, Inc., Deer Park, N.Y., $4,057,317 (two contracts) for adapters and fin assemblies for bombs; Cooper-Bessemer Co., Mount Vernon, Ohio, $4,055,825 increment to a contract for diesel-engine generator units and auxiliaries for Sentinel System sites; and

Ford Motor Co., $3,962,900 (two contracts) for M151A1 utility trucks and engineering support to produce 5-ton trucks; Talley Industries, Inc., Mesa, Ariz., $3,909,427 for M18 grenades; Fisher Chemical Corp., Englewood Cliffs, N.J., $3,876,660 for chemicals; Keystone Manufacturing Co., Boston, Mass., $3,815,606 for parts for artillery fuze delay plungers; TRW, Inc., $3,500,000 (two contracts) for research and development; Batesville Manufacturing Co., Camden, Ark., $3,129,663 for canisters; and

A MILESTONE was passed recently at the Army Aeronautical Depot Maintenance Center (ARADMAC), Corpus Christi, Tex., when the center overhauled its 10,000th turbine aircraft engine. The T–33 L–13 engine was destined for Vietnam to power a UH1H helicopter. Looking over the completed product are (from left) Col Luther G. Jones Jr., ARADMAC commander; Frank Soliz,, T–53 engine project manager; and Col Delbert L. Bristol, deputy CO for Logistics, Army Aviation Systems Command, St. Louis, Mo. The first turbine engine overhauled at ARADMAC was in 1962 and only 19 were completed that year. The FY 1969 overhaul and repair schedule is 6,333.

Grumman Aircraft Engineering Corp., $3,075,140 for modernization of OV–1A aircraft; KDI Precision Products, Inc., Cincinnati, Ohio, $3,055,985 for safety and arming devices for fuzes; Consolidated Box Corp., Tampa, Fla., $3,022,974 for ammunition containers; Lockheed Aircraft Corp., $2,600,000 for radar set repair parts for the Vulcan air defense system; Zeller Corp., Defiance, Ohio, $2,516,603 for 20mm projectile parts; Whittaker Corp. Saugus, Calif., $2,376,000 for 20mm ammunition fuzes; and

Pace Corp., Memphis, Tenn., $2,336,560 modification for flares; Kollsman Instrument Corp., Elmhurst, N.Y., $2,319,000 for fuze parts; Harvey Aluminum Inc., $2,317,988 (two contracts) for projectiles and parts; AVCO Corp. $2,307,169 (two contracts) for helicopter engines and housing assemblies; Honeywell, Inc., $2,265,000 for parts for artillery shell fuzes; Intercontinental Manufacturing Co., Garland, Tex., $2,250,000 modification for 152mm projectile parts; and

Galion Amco, Inc., Galion, Ohio, $2,159,700 for 20mm fuze parts; Boeing Co., $2,145,570 for rotary-wing heads for CH–47 aircraft; Beech Aircraft Corp., $2,137,215 for bomb dispensers; Land-Air, Inc., Grand Prairie, Tex., $2,072,000 for projectile plugs; General Dynamics Corp., $2,071,233 for Redeye missile system engineering services; Paper Tubes, Inc., Buffalo, N.Y., $2,062,751, and Federal Container Corp. of Tennessee, $2,043,956 for ammunition containers.

Contracts under $2 million. Bauer Ordnance Corp., Warren, Mich., $1,991,400 for bayonets for M16 rifles; Automatic Sprinkler Corp. of America, Dallas, Tex., $1,990,674 for bomb dispensers; Sylvania Electric Products, Inc., $1,989,000 for R&D in electronic warfare; and

Cessna Aircraft Corp., $1,977,985 contract modification for bomb dispensers; Kilgore Corp., Toone, Tenn., $1,935,360 for 105mm shells; M. Steinthal and Co., New York, N.Y., $1,918,142 for cargo parachutes; Switlix Parachute Co., Inc., Trenton, N.J., $1,918,142 for parachutes; Mills Manufacturing Co., Asheville, N.C., $1,918,142 for parachutes; and

Supreme Products Corp., Chicago, Ill., $1,877,720 for 20mm fuze parts; E. J. Walters Co., Elk Grove Village, Ill., $1,815,447 for parts for bomb bodies; Lockheed Aircraft Service Co., Lake Charles, La., $1,811,000 for inspection and repair of UH–1D helicopters; Kennedy Van Saun Corp., Danville, Pa., $1,805,144 for 90mm projectile parts; and

Hughes Aircraft Corp., $1,719,262 contract modification for missile guidance sets for TOW weapons system; G-Z Products, Rancho Cordova, Calif., $1,659,530 for projectile grommets; Hayes Albion Corp., Albion, Mich., $1,597,320 for metal parts for 2.75-inch rocket warheads; and

L. E. Mason Co., Hyde Park, Mass., $1,579,368 for parts for bomb cluster assemblies; Techfab Division of ALSCO, Inc., St. Louis, Mo., $1,510,687 for rocket launchers; and

URS Corp., San Mateo, Calif., $1,475,000 contract modification for design, development, programing and testing of control center prototype software; Ametek, Inc., Sheboygan, Wis., $1,470,800 for 2.75-inch rocket stabilizer rods; John Wood Co., St. Paul, Minn., $1,454,441 for 500-pound bomb fin assemblies; and

Brown Engineering Co., Inc., $1,361,852 for technical support on the Sentinel System; Chrysler Corp., $1,312,093 contract definitization for advanced production engineering for the XF746 truck and XM747 semi-trailer; Bell Aero-Systems, Tucson, Ariz., $1,297,940 for a study of electromagnetic data collection; Lockheed Electronics Co., Plainfield, N.J., $1,295,000 for radar sets and installation kits; and

Hayes International Corp., Birmingham, Ala., $1,290,000 for parts for 2.75-inch rocket warheads; Aerojet General Corp., $1,214,986 for parts for 2.75-inch rocket warheads; American Fabricated Products Co., Inc., Indianapolis, Ind., $1,189,000 for cartridge containers; Model Screw Products, Inc., Hazelwood, Mo., $1,168,500 for cartridge containers; Federal Laboratories, Inc., Saltsburg, Pa., $1,140,221 for hand grenades; and

Raytheon Co., $1,123,429 for product assurance and engineering services for the Hawk missile system; National Union Electric Corp., Bloomington, Ill., $1,116,000 for bomb fuzes; Sargent Brothers Division of Parker-Hannifin Corp., Tulsa, Okla., $1,097,434 for UH–1 helicopter damper assemblies; Stone Container Corp., Chicago, Ill., $1,030,481 for ammunition containers; and Minnesota Mining and Manufacturing Co., $1,000,000 for electronic equipment.

TECOM Evaluating Army Aviation Crewmen Uniform

An experimental summer uniform for Army aviation crewmen is being evaluated at test sites of the U.S. Army Test and Evaluation Command.

The U.S. Army General Equipment Test Activity at Fort Lee, Va., is weighing the merit of an ensemble consisting of a shirt, trousers, transitional jacket, gloves and belt, together with standard Army footwear and underwear.

The experimental shirt and trousers are fabricated from two layers of NOMEX fabric which will protect against high-intensity flash or flame. The gloves, 4-finger-and-thumb gauntlet style, are long enough to protect the wrist and forearms of the wearer. The back of fingers and thumb of the gloves are constructed of 9.1-ounce simplex-knitted fire-resistant NOMEX material; the palm and front of fingers and thumb are made of sheep hair leather.

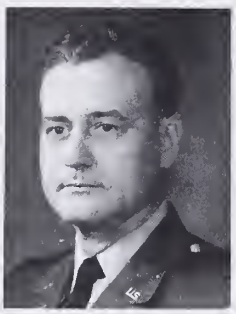
Intended for use by both flying and ground personnel, the lightweight uniform is aimed at increasing the functional suitability and appearance of present gear. It may replace flying apparel of Air Force and Navy origin issued to Army aviation crewmen since World War II.

Engineering tests being conducted by the General Equipment Test Activity are designed to determine the technical performance and safety characteristics of the new uniform. These tests include consideration of thermal and environmental protection, flammability, fabric strength and durability, color, appearance and static electricity characteristics.

Service tests under simulated and actual field conditions will be performed by other elements of the Test and Evaluation Command.

The U.S. Army Aviation Test Board, headquartered at Fort Rucker, Ala., will evaluate the uniform in several locales. In Panama, it will be tested under tropical environmental conditions by the U.S. Army Tropic Test Center in the Canal Zone.

Col W. H. Tucker Jr.



Lt Col E. B. Ross

Lt Col L. S. Lodewick

Lt Col F. A. Carter

Lt Col G. Fisher Jr.

OCRD Announces 5 Personnel Assignments

Assignment of Col William H. Tucker Jr. as executive officer headed personnel actions within the Office of the Chief of Research and Development, HQ DA, this past month. Col (Brig Gen-designate) Stewart C. Meyer, who completed a tour of duty in that office, is now assistant to the Deputy Director of Defense Research and Engineering (Tactical Warfare Programs).

Col Tucker served in the forerunner to the Office of the Chief of R&D as it is now constituted for about two years until OCRD was established Oct. 10, 1955. He continued with OCRD until 1956, in varying capacities as staff officer, branch chief in the International Division and assistant executive. He returned to OCRD in 1962 as an R&D coordinator and from 1963 to 1965 was assistant executive.

From June 1967 until he assumed his present duties he was an operations staff officer, J–3, Joint Chiefs of Staff in the Pentagon.

Col Tucker holds a BS degree in military science from the University of Maryland (1955), an MS degree in personnel administration from George Washington University (1965), and has completed graduate studies in nuclear physics at the University of Virginia.

He is a veteran of five campaigns with the 2d Infantry Division in Korea (1950–52). He served with HQ U.S. Army Southern European Task Force (SETAF), Verona, Italy (1959–62) and with the U.S. Army Training Center (USATC), Fort Sill, Okla. (1965–66).

A 1967 graduate of the U.S. Army War College (AWC), he holds the Bronze Star Medal (BSM) with V Device, and the Army Commendation Medal (ARCOM) with two Oak Leaf Clusters (OLC).

Lt Col Edgar B. Ross is serving as a staff officer with the Review and Evaluation Office, OCRD. Until recently he was assigned to HQ 38th Artillery Brigade in Korea.

A 1949 graduate of the U.S. Military Academy (USMA), he completed the Command and General Staff College (C&GSC) in 1961, the Armed Forces Staff College (AFSC) in 1964, and the Defense Education Program course conducted by the Institute of Defense Analysis in 1967.

He served with HQ Allied Land Forces Southeast Europe, Turkey (1964–66) and with HQ 52d Artillery Brigade, Highands, N.J. (1961–63). He received the Purple Heart for action in Korea and holds the BSM.

Lt Col Lawrence S. Lodewick is a new staff officer in the Management and Evaluation Division, OCRD.

His assignment follows a year as chief of the Analysis Branch, Research and Analysis Division, Office of the Assistant Chief of Staff for Civil Operations and Revolutionary Development Support, HQ Military Assistance Command Vietnam.

Graduated from the USMA in 1950, he earned an MSME degree from the University of Michigan in 1958 and completed the C&GSC in 1964.

Lt Col Lodewick is a member of the Operations Research Systems Analysis (ORSA) specialty field and served with the Defense Communications Planning Group, Intelligence and Evaluation Directorate at the Naval Observatory, Washington, D.C.

Other major assignments include service with the Materiel Directorate, HQ U.S. Army Combat Developments Command (USACDC), Fort Belvoir, Va. (1965–66); Ist Battalion, 51st Infantry, 4th Armored Division, Germany (1963–64); and HQ 7th Army, Germany (1961–63).

He wears the BSM, ARCOM, and Republic of Vietnam Medal of Honor.

Lt Col Frank A. Carter is a staff officer in the Critical Projects Branch, Southeast Asia Division, following a year with the U.S. Army Strategic Communications Command Signal Brigade in Korea.

Other assignments have included service with the U.S. Army Element, Military Assistance Advisory Group (MAAG), Iran (1962–64); U.S. Army Armor School (USAARMS), Fort Knox, Ky. (1960–62); and 124th Signal Company, SETAF (1956–58).

Lt Col Carter received a BSEE degree from Oklahoma A&M in 1952 and an MSEE degree from Stanford in 1967. He completed the C&GSC in 1965. From 1958 to 1960 he was a student and then an instructor in the Armor School. Among his medals are the BSM and ARCOM.

Lt Col George Fisher Jr. returned from Vietnam, where he served a one-year tour as S–3 and commander, 173d Airborne Brigade, prior to his assignment as a staff officer in the Programs Branch, Programs and Budget Division.

He served at the U.S. Army Infantry School at Fort Benning, Ga. (1966–67 and 1962–64) and from June 1965 to May 1966 was assigned to the Comptroller Division, HQ U.S. Army Europe (USAREUR).

Lt Col Fisher has a 1953 BA degree in economics from Lafayette College and completed the C&GSC in 1965. His honors include the BSM. Legion of Merit and ARCOM with OLC.

CDCEC Conducting Phase II Of IRUS-75 Study at Fort Ord

Phase II, the "hot stage," of IRUS–75 (Infantry Rifle Unit Study-1975) is being conducted by the U.S. Army Combat Developments Command Experimentation Command at Fort Ord, Calif.

The CDCEC study began in February 1967 and Phase II is scheduled for completion in May 1969. Experiments at the Hunter Liggett Military Reservation, the scientific field laboratory of the CDCEC, are directed by Col John Hoye.

Designed specifically to provide answers for Infantry operations in the 1970–75 time frame, the experiments also are expected to provide information helpful in increasing effectiveness of the small Infantry units in Vietnam operations.

Guthrie Assigned to AMC HQ as Deputy Director

Brig Gen John R. Guthrie, a pioneer in U.S. Army missile and space satellite development, reported for duty Nov. 18 as deputy director, Development and Engineering (Operations), HQ Army Materiel Command.

Like his predecessor in that office, Brig Gen George Sammet Jr., now assigned to the U.S. Army Advisory Group in Korea, General Guthrie is well known to personnel in the Office of the Chief of R&D, HQ DA. He served with the Missiles and Space Division (1956–58) and headed the Developments Directorate (1966–67).

General Guthrie departed OCRD in August 1967 for assignment to the U.S. Army Advisory Group in Korea and later became assistant commander, 2d Infantry Division. He served as a staff officer with the Joint Chiefs of Staff, Washington, D.C., in 1965–66.

Explorer I, the U.S. and Free World's first artificial earth satellite, was launched under his monitorship as Army staff project officer. An assignment followed as military assistant, then as assistant executive, Office of the Secretary of the Army.

In 1961 he graduated from the National War College and was assigned to the staff of the Commander-in-Chief-Pacific until he became chief of staff, 25th Infantry Division Artillery. Other assignments have included: commander, 602d Field Artillery Battalion; S–3, 3d Infantry Division Artillery, Far East Command; instructor, Artillery and Guided Missile School, Fort Sill, Okla.

Brig Gen John R. Guthrie

General Guthrie was graduated from Blair Academy, Blairstown, N.J., in 1938 and from Princeton University in 1942. Among his military decorations are the Legion of Merit, Bronze Star Medal (two OLC), Joint Service Commendation Medal, Army Commendation Medal, and the Presidential Unit Citation Republic of Korea.

WES Contracts for Prefab Aircraft Landing Mats

Contracts for R&D activities directed toward lighter, stronger and more economical prefabricated aircraft landing mats are being negotiated by the Corps of Engineers Waterways Experiment Station, Vicksburg, Miss.

Mats will be produced for three categories of use, light, medium and heavy-duty, and evaluated in engineering tests at WES. Aircraft wheel-load tests will be used to evaluate the design. If satisfactory in tests, the mats will be procured in larger quantities for field tests using various aircraft.

The requirement for prefabricated metal landing mats has increased tremendously during U.S. Army operations in Southeast Asia. Airmobile units and new tactical concepts have resulted in the need to ship about 225,000,000 square feet of prefabricated surfacing to Vietnam. All available types were investigated and tested by WES researchers.

One of the most recent additions to the landing mat designs is an aluminum honeycomb sandwich structure, 4 x 4 feet. An individual panel weighs 68 pounds and can be handled easily by two men.

Another type is an extruded aluminum mat, 2 x 2 feet, containing integral side connectors and welded end connectors, weighing 120 pounds and emplaceable by 2-man crews.

Brig Gen Podufaly Assigned as TOPOCOM Commander

Transfer-of-command ceremonies Nov. 18 installed Brig Gen Edward T. Podufaly as CG of the Army Topographic Command (TOPOCOM) and successor to Maj Gen Robert R. Ploger, who retains his other duty as director of Military Engineering, Office of the Chief of Engineers.

Maj Gen Carroll H. Dunn, acting Chief of Engineers, presided at the ceremonies before a group of distinguished guests and employes of the U.S. Army Map Service.

TOPOCOM is a Class II installation under the Chief of Engineers. It consists of the Army Map Service, the Engineer Topographic Laboratories and the 30th and 64th Engineer Battalions.

In his new position General Podufaly carries the title of "Topographer of the Army," with responsibility for advising Chief of Engineers Lt Gen William F. Cassidy on all matters relating to mapping and geodesy. His headquarters, temporarily in Building T–7 at Gravelly Point, Va., will be located in the Army Map Service Compound next year.

Until reassigned, General Podufaly was stationed in Honolulu, Hawaii, as division engineer, Pacific Ocean Division, Army Corps of Engineers.

Brig Gen Edward T. Podufaly

560-W. Hydrocarbon Fuel Cell Developed for Quiet Operation

Newest addition to the family of fuel cells using hydrocarbon fuels being developed in the Electronic Components Laboratory, HQ U.S. Army Electronics Command, Fort Monmouth, N.J., is a 560-watt system.

Designed to be carried in the field by two men as a power source for radars, radios and other electronic equipment, the new unit is in the advanced development stage. In tests, it has proved capable of five days of unattended operation from a 5-gallon container of JP–4 jet fuel or CITE (compression, ignition and turbine fuel).

The unit is inaudible at a distance of 50 feet. For nighttime use, particularly, this quiet operation makes it less likely that the enemy will discover critical positions. Portable forward-area electronic equipment used at present is generally powered by batteries, requiring use of noisy engine generators for recharging.

The 8-year-old fuel cell development program of the Electronics Command is under direction of Frank J. Wrublewski, employed in the Power Source Systems Branch of the Power Sources Division headed by Dr. Galen R. Frysinger. Dr. Eduard A. Gerber is director of the Electronic Components Laboratory.

Kudos

SPECIAL ACT AWARD. Twelve individuals shared in awards totaling $10,140 for special acts at Picatinny Arsenal, Dover, N.J.

Benjamin Harris, Richard Pietrzak, and *Robert Mountford Jr.,* employed in the Bomb and Fuze Laboratory, Ammunition Engineering Directorate (AED), split $3,000 for redesigning a component of a new series general purpose bomb used in Southeast Asia.

A $5,000 award was shared by seven employes of the Applications Engineering Lab, AED, for developing improved manufacturing procedures for the M–449 155mm and M–404 8-inch projectiles. They are *James Gaida, Russell Tomlinson, Alden J. Blethen, Aaron Vogler, Donald Ruggerie, Nathan Seiden* and *Stanley Lieberman,*

A suggested way of renovating the AN–ALA–17 flare set earned *Neil Lampner* of the Methods Engineering Division, Industrial Services Directorate, $1,235. *Lawrence D. Honablew* of the AED Process Engineering Laboratory received $905 for improving design of a component of the M–904 and M–905 bomb fuzes.

MERITORIOUS CIVILIAN SERVICE. *Edward R. Barron,* a body armor technologist at the U.S. Army Natick (Mass.) Laboratories, received the MCS Award for his role as project officer in the development of body armor.

He was cited for "outstanding achievements in the conception and design of a body armor system making possible a practical means of protecting the soldier from ball ammunition heretofore unavailable."

LEGION OF MERIT. *Col Benedict L. Freund,* deputy chief of the Physical and Engineering Sciences Division, U.S. Army Research Office, OCRD, received the LOM for service as CO of the U.S. Army Wound Data and Munitions Effectiveness Team (Vietnam), March 1967 to June 1968.

The citation states that his actions in carrying out the mission demonstrated that . . . "a major research effort in direct contact with combat operations could be conducted while imposing negligible interference on these operations. . . .

"The results of this research, involving the basic equipment of the American soldier, have been cited by the Office of the Chief of Research and Development and will have a direct effect on military research and development in the future. . . ."

Col Keith E. Sickafoose, chief of the Low Altitude Systems Branch, Air Defense and Missiles Division, OCRD, received the LOM for 10 years outstanding service from November 1958 to October 1968.

During this period he served as test officer and then as chief, Hawk Test

Brig Gen Franklin M. Davis Jr., with wife Erma and Army Vice Chief of Staff General Bruce Palmer Jr., after receiving Distinguished Service Medal, Distinguished Flying Cross and Bronze Star Medal with "V" Device for service in Vietnam. Brig Gen Davis received the awards for service as assistant chief of staff for personnel, HQ MACV and later as CG, 199th Infantry Brigade. He is now serving as director of Personnel Studies and Research, ODCSPER.

ECOM IER Director Moves Up to ODDR&E

Apologies of the *Army R&D Newsmagazine* 2-man staff are in order to Dr. S. Benedict Levin for slipping up on timely announcement of his recent appointment as Deputy Assistant Director (Research), Office, Director of Defense Research and Engineering.

Until he departed for Washington, D.C., to report to his new duties, Dr. Levin was director, Institute for Exploratory Research, Army Electronics Command, Fort Monmouth, N.J.

Dr. Levin is the second former IER director to become DAD (Research) ODDR&E. Dr. Edward M. Reilley was IER director from 1959 until January 1964 when he departed and was succeeded by Dr. Levin. Dr. Reilley served in ODDR&E until June 1967 when he resigned to accept his present position as the first director of R&D, U.S. Post Office Department.

In his new capacity, Dr. Levin will be concerned with formulation of research policies and plans and with evaluation of scientific research programs in DoD laboratories as well as in DoD-supported university and industrial laboratories.

Widely known for his work on numerous advisory groups of the DoD technical community and the National Academy of Sciences in the areas of materials, earth sciences and research management, Dr. Levin also has gained recognition for publication of many scientific papers. He was a member of The Army Research Council (TARC) when it was created in January 1964.

Columbia University awarded Dr. Levin his degrees—AB in 1931, BS in 1932, EM in 1933 and PhD in 1948. His undergraduate work was in physics, mathematics and chemistry; his graduate studies in geology, engineering and geophysics.

Dr. Levin is a member of Phi Beta Kappa, Tau Beta Pi, Sigma Xi, and the American Physical Society. He is a Fellow of the Geological Society of America, the American Mineralogical Society, American Association for the Advancement of Science, and the American Geophysical Union.

Dr. S. Benedict Levin

Branch, Missile Systems Test Division, Air Defense Board, Fort Bliss, Tex.; chief, U.S. Army Europe Special Weapons Liaison Group to HQ Allied Land Forces Central Europe/ Allied Forces Central Europe, and concurrently as an action officer, Special Weapons Branch, G–3 Division, Allied Land Forces Central Europe;

Commander, 6th Missile Battalion, 5th Artillery, Land Forces Central Europe; project officer, Plans and Programs Division, and then as chief, Contract Support Branch, Management Division, U.S. Army Combat Developments Command Combat Arms Group, Fort Leavenworth, Kans.; and in his present position.

Col Claude G. Baughman, comptroller, U.S. Army Natick (Mass.) Laboratories, received the LOM for service in "positions of trust and responsibility with the Office of the Inspector General, DA, from December 1965 to September 1968."

During this period, "he participated in numerous inspections of major Army field commands and installations throughout the world. He detailed research and analysis of each command and his keen insight into the pitfalls inherent in their operational environment resulted in the identification of many problems requiring corrective action."

Lt Col John E. Steinke, Tactical Satellite Communications Office, OCRD, received the LOM for performance of outstanding service from June 1967 to May 1968.

During this time he was chief, Integrated Wideband Communications System Management and Engineering Office; deputy chief, Communications Systems Engineering Management Agency; and CO, Long Lines Battalion North, U.S. Army Regional Communications Group, 1st Signal Brigade.

He was cited for major contributions ". . . to the continuing progress of communications projects which provide the principal Defense Communications System and theater fixed facilities in support of military operations in Vietnam."

The LOM was awarded to *Lt Col Joseph F. Castro*. Review and Evaluation Office, OCRD, for serving consecutively from June 1967 to June 1968 as CO, 39th Engineer Battalion (Construction) and CO, 26th Engineer Battalion (Combat), Americal Division, Vietnam.

"Through his ingenuity, rare foresight, and the application of sound principles of engineering, Lt Col Castro overcame a multitude of complex problems to ensure that optimum support was furnished to active tactical forces," the citation states.

JOINT SERVICE COMMENDATION MEDAL. *Col George D. Scarborough*, an R&D careerist formerly assigned to the Plans Division, OCRD (1963–67), received the JSCM for service with Joint Task Force II at Sandia Base, N. Mex.

Col Scarborough was cited for his role in demonstrating the feasibility of several new and unique weapon instrumentation developments.

"The success of these efforts can be largely attributed to his comprehensive knowledge of research and development procedures and his professionalism as a leader. He excelled in all coordinative functions involving both joint services and top management personnel for civilian industry."

5 ECOM Employes Gain 3 Patents for ECL Inventions

Inventions originating from in-house research at the U.S. Army Electronics Command Electrical Components Laboratory, Fort Monmouth, N.J., recently gained patent awards for two individuals and a 3-man team.

Kenton Garoff, chief of the Electron Tubes Division, received a patent for a "modified traveling-wave tube" that is shorter, lighter and cools more efficiently than the type tube it is designed to replace. More capable radar equipment for military use is expected to be produced by using the newly invented tube.

Samuel Dixon Jr., a physicist in the Electron Tubes Division, received a patent for an "RF (radio frequency) Power Limiter." The invention will have application to military microwave systems, including radar and communications equipment, in which miniaturization is a major goal.

John E. Creedon, Sol Schneider and Stuart J. Shapiro pooled their talents to gain a patent for fossil-fuel-fired thermionic converters that generate electricity directly from heat.

Gasoline is among the fossil-fuel heat sources for the converters, and emphasis is on methods to remove unwanted gases that may enter converters from the flame atmosphere. Thermionic converters are being developed by the Army as portable power supplies for field operations.

Creedon is chief of the Gaseous Electronics Section, Schneider heads the Gaseous Electronics Devices Branch and Shapiro is a physical scientist in the Power Sources Division, Electronic Components Lab.

MICOM Expands Concept Of Vertical Management

Concepts for vertical management of weapon systems are being extended to additional categories of equipment at HQ Army Missile Command, Redstone (Ala.) Arsenal, by establishment of two Product Management Offices and two new Commodity Offices.

General Frank S. Besson Jr., CG of the U.S. Army Materiel Command, has designated Target Missiles and the Land Combat Support System (LCSS) for product management. Product Management Offices also are planned for the Air Defense Control and Coordination System and Multiple Artillery Rocket System.

Changes in management concepts for these programs will not result in any over-all increase in personnel, but will concentrate over-all management responsibilities for development, procurement, production, testing, distribution, and logistics for each program in one office.

These functions were carried out previously by personnel in Commodity Offices and in the Research and Development, Procurement and Production, and Supply and Maintenance Directorates at the Missile Command.

Col Robert W. Van Wert has been named acting product manager for Target missiles. His primary duty is deputy to the deputy for Air Defense Systems at the Missle Command, and he has served as chief of the Air Defense Commodity Office.

New product manager for the LCSS is Lt Col Frank A. Matthews, who was transferred from the Pershing Project Manager's Office where he headed the System Support Division.

The new Commodity Offices are for Aircraft Weapons, with William Rotenberry as acting chief, and for Land Combat Weapons, headed by Herman Martin as acting chief.

The Aircraft Weapons Commodity Office will manage the application of TOW missiles on the new helicopter, Cheyenne, and airborne rocket launchers. The Land Combat Weapons Commodity Office covers management of the Honest John and Little John rockets, ENTAC and the LAW training device.

Already in operation at the Missile Command are 10 project management offices chartered or to be chartered by the Secretary of the Army for the major missile systems.

The Commodity Offices have responsibility for older weapons systems or for weapons that support systems under project managers elsewhere.

SARS Fellow at Cambridge Participates in RNA Research Project

"Considerable significance" is being claimed for a report on results of investigations by a Walter Reed Army Institute of Research scientist in collaboration with a research group while on a Secretary of the Army Research and Study Fellowship at Cambridge University.

Dr. Bhupendra B. Doctor returned to WRAIR in mid-November from a year of joint effort in England with published evidence that results of the research project are gaining recognition. He collaborated with B. F. C. Clark, K. C. Holmes, A. Klug, K. A. Marcker, S. J. Morris and H. H. Paradies, all members of a Medical Research Council team at Cambridge.

Some of the findings of the project are reported in the Sept. 21, 1968, issue of *Nature*, an international journal of science, including editorial comment under "News and Views" on the significance of results. The comment attributes "yet another scoop" to the MRC Molecular Biology Laboratory. Results also were reported in the *London Times* "Science Report."

Relative to the feat of the group in crystallizing a species of transfer RNA (ribonucleic acid), the *Nature* journal comments:

". . . This is the first time that any tRNA molecule has been obtained in a crystalline form, and it is now possible to think of using X-ray crystallography to determine the tertiary structure of the kinds of RNA molecules which seem to play the most active part in the process of protein synthesis—that of singling out amino-acids and arranging them in the order in which they are strung together in protein molecules.

"The particular species of transfer RNA which has been crystallized is that which, in the bacterium Escherichin *coli*, is responsible for carrying the formyl methionine units which are, in turn, involved in the initiation of protein . synthesis. To be sure, the crystals which have so far been obtained are only microcrystals a few microns in diameter and therefore too small for the single crystal X-ray analysis from which detailed structural data must be selected.

"There is every chance, however, that the method which has been worked out for growing microcrystals can somehow be modified to obtain larger specimens from which structural information can be won. . . . Preliminary calculations suggest that the unit cell contains four tRNA molecules in an orthorhombic array, dimensions of the three sides of the rhombus being 118A, 43.2A and 53.2A.

"With luck, it is even possible that when large single crystals have been grown the tertiary structure of this species of tRNA may be determined without recourse to the heavy atom substitution procedure necessary for the elucidation of the structure of protein by X-ray crystallography. . . .

"There remains, of course, the old question of whether the crystal structure of a biological molecule is relevant to its structure in the living organism. For proteins, it is becoming increasingly obvious that the structure in solution closely resembles that in the crystal state, for enzymes will still function when they are crystallized. . . ."

As part of his Secretary of the Army Research and Study Fellowship plan, Dr. Doctor attended a month-long course on the Molecular Biology of Bacterial Viruses at the International Laboratory of Genetics and Biophysics in Naples, Italy. He was a NATO Fellowship recipient while attending this course in September.

Dr. Doctor also presented a paper, "The Structure of Nucleic Acid," at the 7th International Congress of Biochemistry in Japan. He has presented a number of technical papers at national and international conferences and is known for publication of more than 30 technical articles.

Dr. Doctor is a native of India where he earned a BS degree from the University of Bombay. He received an MS degree in biochemistry and nutrition from Texas A&M and a PhD from the University of Maryland. Then he was a postdoctoral Fellow for a year at Cornell University.

TAG Letter Encourages Dissemination of R&D Results

Encouragement to Army scientists to disseminate results of scientific investigations when findings are considered noteworthy is reemphasized, within security limitations, in a recent TAG letter, "Publication of Basic and Applied Research Information."

The letter reiterates basic Army policies set forth in AR 70–14, "Payment of Costs of Reprints of Articles in Professional Journals"; AR 70–31, "Standards for Technical Reporting"; AR 360–5, "Army Information General Policies"; AR 380–5, "Safeguarding Defense Information"; and AR 705–55, "Management of U.S. Army R&D Centers and Laboratories."

In effect, the TAG letter restates a philosophy that has prevailed among Army R&D managers for more than a decade, that is, to encourage, within appropriate guidelines, "release of scientific and technical information at the lowest possible level . . . both basic and applied research . . . (as) a most appropriate form of peer recognition" for Army in-house laboratory personnel.

By request of Director of Defense Research and Engineering Dr. John S. Foster Jr., regional and bureau directors of the U.S. Civil Service Commission visited a selected group of scientific activities of the Department of Defense in May and June 1967. This group recommended that the Army review security restrictions on publication of research papers and encourage an increase in publications.

Army Regulation 70–14 states that "Dissemination of the results of the information about scientific research is an important part of the research process." It further notes that:

". . . Publication in this manner to make these results known to scientific and technical research activities and personnel both within and without the government is necessary to the conduct of the Army's research and development program."

'Bushmaster' Cannon Proposals Scheduled for Early in 1969

Competitive proposals for development of a new automatic cannon system nicknamed "Bushmaster," intended as a successor to some caliber .50 machineguns and the M139 20mm guns, are scheduled early in 1969.

Responsibility for development of the new system is assigned to the U.S. Army Materiel Command project manager for Vehicle Rapid-Fire Weapon Systems, Lt Col Patrick H. Lynch.

Plans call for award of developmental contracts in the third quarter of the new year and production of the Bushmaster is tentative in the mid-1970 time frame, the AMC reported.

The cannon is expected to be 20mm or larger and its system will permit the gunner to select the type of ammunition which will be most effective against the particular target being engaged. Specifications will provide for increased range and lethality of the various types of ammunition.

CE Announces Division Changes

Brig Gen Roy S. Kelley, currently engineer for the U.S. Army Europe and Seventh Army, will become division engineer for the Army Corps of Engineers North Pacific Division in early February 1969 as successor to Brig Gen Elmer P. Yates, who has been assigned to duty in Vietnam. Col Charles A. Carroll, has been named Acting Division Engineer pending General Kelley's arrival.

ECOM, CE Exhibit R&D Achievements at AAAS Meet

Two exhibits representative of notable achievements of Army in-house laboratory scientists will be shown at the annual meeting of the American Association for the Advancement of Science in Dallas, Tex., Dec. 27–30.

Sponsored by the Office of the Chief of Research and Development, the exhibits are titled "Active Sensors Based on Ionic Charge Transport," displayed by the Army Electronics Command, and "A Geodetic Distance Measuring Instrument," shown by the U.S. Army Corps of Engineers.

The ECOM exhibit will demonstrate the versatility, sensitivity and responsiveness of simple, easily made solid ionic devices which in extensive experiments have proved capable of:

- Responding to even minute deforming forces by spontaneous generation of low impedence voltages.
- Responding to a change in temperature with a speed and sensitivity several times better than the best bimetallic thermocouples, such as displaying changes in breath temperature associated with speech.
- Being used as rechargeable solid-electrolyte batteries amenable to fabrication using the wide design latitude of thin-film, vacuum-deposition techniques.

The exhibit also will demonstrate that multiple-terminal ionic devices can be used as incrementable memory elements with current reading and voltage readout; also, that they can be used as precision balancing devices whose center of gravity can be changed by means of externally controlled current flow.

Dr. John N. Mrgudich, a research physical scientist at ECOM, prepared the display and authored a feature article on "Electronically Active Ionic Devices" published in the November issue of the *Army R&D Newsmagazine*, p. 26. Copies of the issue will be available at the AAAS meeting.

The Corps of Engineers Geodetic Distance Measuring Instrument is used in mapping to measure distances from 100 meters to 50 kilometers with a precision better than one part in one million or to study effects of refractive index variations on distance measurements.

"Perhaps the world's finest portable distance-measuring instrument," is the way U.S. Army Engineer Topographic Laboratories personnel at Fort Belvoir, Va., describe the geodolite. It was a featured exhibit at the annual meeting of the Association of the U.S. Army, Oct. 28—30, in Washington, D.C.

Under contract with the Office of the Chief of Engineers, the geodolite was developed by Spectra-Physics Corp, of Mountain View, Calif. The laser linked to a high-speed computer weighs about 90 pounds complete with control unit and tripod. It uses 110 volts from a conventional source or from a portable gasoline generator.

A feature story on the capabilities of the instrument was published in the May issue of the *Army Research and Development Newsmagazine* when the unit was exhibited first to a select group of Army scientists at the Engineers Topographic Laboratories Research Institute in Alexandria, Va.

Kenneth Robertson, research physicist and task leader in optics at USAETL, has carried out test plans and will demonstrate the instrument at the AAAS meeting.

Jack B. Fenn, Data Management Division, U.S. Army Research Office, OCRD, is project officer for display of the Army exhibits in Dallas.

The annual AAAS meeting draws more than 7,000 registrants. Organized in 20 sections of scientific disciplines, the AAAS is the world's largest federation of scientific organizations, with more than 120,000 scientists and other persons interested in supporting its aims and activities.

Sp/5 Lori Baker of the Women's Army Corps' Exhibit Unit poses beside laser geodolite during demonstration at recent Association of the U.S. Army convention in Washington, D.C.

CDC Reviews Artillery Requirements Through 1980

Problems in establishing priorities of development for "Artillery 1980" to insure delivery of items to the field when needed were discussed at a recent review attended by 130 representatives of all major commands and general staff, Department of the Army.

The review conducted by the Army Combat Developments Command at Fort Sill, Okla., encompassed concepts and the over-all artillery anticipated requirements from the present through 1980. Discussions dealt with development of ammunition, cannon artillery, surface-to-surface missiles, aerial artillery and target acquisition.

Results of the review are expected to have their initial effect beginning in the mid-1970s, and are pertinent to two Combat Developments Command studies for the future Army in 5-year time frames ending in 1975 and 1985. Subsequent conferences over the next few years will update the results in accordance with the existing potential threat.

General officers at the review included Lt Gen Harry W. O. Kinnard, CG of the CDC, who gave the keynote address; Lt Gen Arthur S. Collins, Assistant Chief of Staff for Force Development; Maj Gen Robert F. Coffin, Deputy Chief of Research and Development, HQ DA; Maj Gen Charles P. Brown, CG and commandant, Artillery Center, Fort Sill; Maj Gen William A. Becker, deputy CG of CDC; Brig Gen George Sammet Jr., deputy director, Developments and Engineering (Operations), Army Materiel Command; and Brig Gen Thomas W. Mellen, Director of Developments, OCRD, HQ DA.

Picatinny Engineer Uses 'Sound Idea' for MSEE Thesis

Army in-house laboratory scientists and engineers seeking an easy way to earn a master's degree might profit from the ingenuity displayed by Dan Ramer, a Picatinny Arsenal employe who found a short cut.

The "big idea" originated with a Qualitative Materiel Development Objective (QMDO) forwarded from Fort Bragg, N.C., asking for a tactical loud speaker capable of transmitting sound a distance of 10,000 feet.

Ramer, an electronic engineer who specializes in electro-acoustics in the Technical Services Laboratory, succeeded in measuring how much acoustic energy can be propagated into the air by a horn-type loud speaker without distortion.

Believing the discovery worthy enough to be used as the basis for his master's thesis, Ramer had the subject approved by the adviser of the Electrical Engineering Department, Newark College of Engineering. As a result, he now holds two degrees from NCE: a BS degree in electrical engineering and an MSEE degree in communication devices. He became a Picatinny employe 15 months ago, after receiving his first degree.

EDS&R to Provide Direct Access to Engineering-Based Data

Engineering-based data represent an invaluable source of information to a wide spectrum of obvious as well as not so obvious users, particularly in the U.S. Army.

An information system that would "unlock" engineering data generated for specific needs and facilitate use for general application would be of inestimable value to the Army, the Department of Defense, other government agencies and the nation.

Rapidly increasing needs for a standardized system have long been recognized. Consequently, approaches to engineering data systems intended to provide quick and direct access to those data have been about as numerous and varied as the related problems. Still there has been stimulating progress. Many useful concepts have been generated and many practical "tools" have been developed.

In recognition of this "state-of-the-art" the Data Management Division, Office of the Chief of Research and Development, has formulated a project identified as Engineering Data Storage and Retrieval (EDS&R). This project has been assigned to the U.S. Army Materiel Command, which has delegated it to the Munitions Command Technical Systems Division.

Project management is retained by MUCOM and technical direction is assigned to the Army's Picatinny Arsenal, Dover, N.J. The project, which has evolved from a concept developed and tested at Picatinny Arsenal, is microfilm-oriented and may be interfaced with computerized data.

The goal of the project is to develop a retrieval system capable of receiving technical data in any format, converting it, coding it, and allowing the user to find it—in the form and in the way *he* wants to find it.

In assigning to Picatinny Arsenal responsibility for Army wide optimization of the EDS&R project, the intention of Army leaders was *not* to attain the objective through new system development. Instead, it is planned to achieve compatibility and an interface between existing information systems hardware, media and procedures that show promise of satisfying research and development as well as logistic problems.

The over-all EDS&R system concept is illustrated in Figure 1. The data bank of the system provides three basic services for the user—storage, retrieval and exchange of engineering data. Elements flow into the data bank in the form of any approved Department of Defense media, including hard copy, punch cards, aperture cards, magnetic tape,

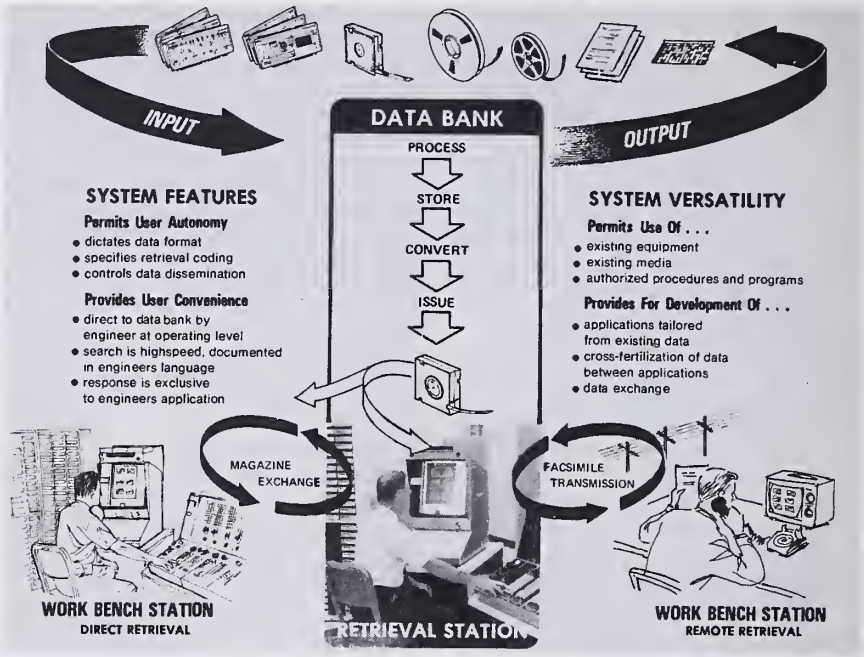


Fig. 1. Over-all EDS&R System Concept

16mm and 35mm roll microfilm and microfiche.

Within the bank, depending on his choice, the user's data element goes into media storage in its original form or, in accordance with the user's request, can flow as output to him in another form. With discrete control established by the user, his data element can be processed, modulated and converted to 16mm magazine roll film for multi-application retrieval.

Search and retrieval operations at the bank are performed on the high-speed, 16mm, random-access retrieval equipment developed by the U.S. Army Missile Command under authority of the DoD Engineering Data System Standardization Project. This equipment was sophisticated at Picatinny Arsenal to facilitate the use of existing data for the input system.

This approach to data storage for a particular application offers at least two means of data transmission to workbench stations remote from the data bank: (1) through transmission (or exchange) of film magazines for direct retrieval at stations having their own 16mm microfilm retrieval equipment; or (2) through facsimile transmission to workbench stations in response to a request from the data bank for a particular document.

The Army EDS&R System concept incorporates features carefully calculated to gain user acceptance. Versatility can extend the utility of the expermiental system to a broad spectrum of technical and nontechnical users. Advantages are more than conceptual or theoretical. Practicability has been demonstrated through developments at Picatinny Arsenal as part of the DoD Standardization Program in connection with the arsenal's nuclear weapons mission.

Tests of selected applications have satisfied operational requirements. Test and pilot films have been prepared for such specific requirements as calibration data, nuclear ordnance sling design data, patents, propellants, descriptive patterns, commercial parts drawings, and Research and Technology Resumes (DoD Form 1498 ongoing work reports).

Evaluation retrieval runs on these films have established the feasibility of the concept—the approach that allows the engineer, at *workbench* level, to do his own search for *information* in his language, obtain a quick response, and get the data *he* needs on the medium of *his* choice.

Provided with this standard "information" capability, engineers have responded to date in a way that shows they will *use* the system as an effective means of avoiding costly duplication of effort and wasteful expenditure of engineering resources. Because of the system's versatility, engineering-based data can be made readily available to *any* activity in need of such data.

Possibilities of operational reality for such a system can be more fully appreciated through an understanding of the background of the

EDS&R project. With the advent in 1960 of the DoD assignment to the Army of responsibility for developing the Engineering Data System (EDS), concentrated efforts were made to standardize the approach to technical data-handling procedures, with emphasis on the needs of the designer and technologist.

The U.S. Army Missile Command (MICOM), as part of this Army-wide assignment, collaborated in developing a 16mm random-access microfilm system to provide for rapid retrieval of data coded in accordance with technical characteristics. When effectiveness in solving the problem of utilization of the system was well established, MICOM designated this approach as Engineering Data System.

Picatinny Arsenal, in evaluating the feasibility of using the EDS in technical data retrieval operations, recognized the potential of the system. As a result it was used as a base for a U.S. Army Munitions Command (MUCOM) test study, in coordination with an assigned project for expanding the use of standard parts and procedures for nuclear weapons.

In working toward this expansion, the MUCOM study group recognized that the needs of the nuclear weapons design engineer are common with the needs of engineers in all fields. To obtain usable information in direct support of product research, development, test and evaluation and maintenance, *any* engineer needs to search for and retrieve data *in his language*. Further, he must be able to retrieve data from many different fields as well as from his own.

The basic approach of the MUCOM Engineering Data System therefore was augmented during the study to provide the capability for access to existing data bases. This development significantly reduced the necessity to create new data elements to meet needs of engineers in the wider use of standard parts and procedures.

A further benefit evolved in that it appeared feasible to extend the utility of the system to all who in any way have need to retrieve, *in their language*, engineering-based data. If so, the concept could also be employed in direct support of product acquisition, inventory management, storage and distribution, as well as for management and distribution of materials, supplies, tools and equipment.

As the nuclear weapons study progressed, it became apparent that a system capable of attaining these goals could be achieved only by strict adherence to the following precepts:

- Utilize existing data bases and hardware within the Army's scope of interest.
- Use existing procedures to assure optimum tie-in of the data to the EDS&R System.
- Evaluate and document these data packages, their advantages as well as shortcomings.
- Limit the data bank to information for which needs are established.
- Formulate an over-all engineering data system control procedure.
- Strive for interface and compatibility with existing DoD information projects, hardware and procedures concerned with data collection, storage and retrieval.

Through the work performed in the test and evaluation of the nuclear weapons study, based on these precepts, it was concluded that the system must:

- Provide for the input of data regardless of input format, with acceptance in the form of EAM cards, magnetic tape, hard copy and all types of microform.
- Evaluate and document existing data-conversion hardware, i.e., magnetic tape to microfilm and 35mm to 16mm microfilm.
- Give the user direct access to the specific information he seeks, in the format he wants, and by characteristic search techniques.
- Be "open ended" to provide for state-of-the-art developments such as remote transmission techniques and on-line direct access systems for data exchange.

The EDS&R project, along with the Information and Data Exchange Experimental Activity (IDEEA) project and the Chemical Information and Data Systems (CIDS) project (see *Army R&D Newsmagazine*, June and October 1967), represents a 3-pronged attack on problems of scientific and technical information exchange and retrieval.

The cardinal concept of the EDS&R system is its intended universal appeal—its designed ability to handle *any* technical or scientific information system problem from data in existing media and make those data readily available—for a wide range of appli-

(*Continued on page 24*)

MICOM Announces Winners of Executive Awards

Winners of the U.S. Army Missile Command's 1968 senior and junior executive awards are the deputy manager of the SAM–D project and a general engineer in the Procurement and Production Directorate.

Maj Gen Charles W. Eifler, CG of the Missile Command, recently presented the awards to Charles A. Cockrell and James H. Valentine.

Cockrell, a 12-year veteran in missilry, received the senior executive award in recognition of his accomplishments in guiding the SAM–D program from the drawing board phase through the advanced development stage. Valentine's citation for the junior executive award acclaimed his outstanding display of organizational and administrative ability.

James H. Valentine

Charles A. Cockrell

Allan Platt, who has performed in a role similar to Cockrell as the Dragon deputy project manager, and John White, assistant director of the Procurement and Production Directorate for Systems Operations, won honorable mention for the senior award.

Another engineer in the Procurement Directorate, Richard Shingler, and Floyd Agee, an accountant in the Finance and Accounting Center, gained honorable mention for the junior award.

Cockrell is a native of Pratt City, Ala., and a 1949 graduate of Auburn University with a BS degree in engineering. He was employed by the Tennessee Valley Authority prior to joining the Army missile team in 1968. He has attended the management program for executives at the University of Pittsburgh's Graduate School of Business and is currently enrolled in the University of Oklahoma's advanced program in governmental studies.

Valentine is a graduate of the University of Tennessee and joined Redstone Arsenal in 1957 as an ordnance officer assigned to the Technical Operations Office. He remained in a civilian capacity when released from active service 2 years later and has since been with the Procurement and Production Directorate.

EDS&R Provides Access to Engineering-Based Data

(*Continued from page 23*)

cations in diverse fields of interest.

Storage. In effect, three storage functions are performed at the data bank: media storage, working storage, and retrieval data storage. In media storage, the data is stored in the form it is received. Working storage involves the function of modulating data elements from the user to the required retrieval applications. The storage media for this purpose are aperture cards and punch cards. The aperture cards are used for storage of graphic data, and the punch cards are used for the storage of digital data.

Any of the input media, or data from these media, can be converted to aperture cards and punch cards, depending on the choice of the activity responsible for the data. Then, from these cards, a conversion is made to 16mm roll film in magazines, representing the retrieval data storage medium of the data bank.

Processing. Processing operations entail three data cards: two aperture cards and one 80-column punch card. The first aperture card contains the image of some basic engineering document and is keypunched to identify that document. The second aperture card, containing the image showing some selected characteristics of the basic engineering document, is keypunched to identify the document. The 80-column card is key-punched to identify each of the characteristics for the particular application.

For every set of established characteristics, there will be one aperture card and one punch card. These cards, in effect, represent the input to the 35/16mm film-conversion equipment.

Conversion. A deck of aperture cards with images of a type of engineering document and a set of aperture and punch cards identifying a type of characteristic are fed to the 35/16mm converter. The converter transforms the image from each of the sets of aperture cards, along with the characteristics on the punch card, into a 16mm, binary-coded, roll film. This film represents the data bank storage medium for that engineering document, coded to identify some specified engineering application or need.

Different sets of these films are processed for each established set of characteristics. This 16mm roll film becomes the record of a particular application stored at the data bank; it will be used in all search and retrieval operations.

Disseminations. The 16mm roll films are distributed to established users. As needed, each user receives revisions of the films.

Retrieval. Each data bank is to include the high-speed, 16mm, random-access retrieval equipment. Basically, the system includes two functioning units: a set of keyboards and a microfilm reader-printer. The station includes convenient film storage racks.

Use of the system to perform searches is extremely simple. Roll films containing data items of interest are selected from the roll film data bank and placed on the display unit. The data items are located automatically on the film by entering the data item code on the display unit keyboard. If the searcher locates an item and desires a reference copy, a "print" button is pressed and a "hard copy" is reproduced in 15 seconds.

This retrieval equipment at the data bank can be looked upon as both a working and a service tool. It is used as a working tool for local checking and monitoring of the data in the bank or it can be employed as a service function in performing searches, on request, for facsimile transmission to "workbench" locations remote from the bank. This concept also permits the direct exchange of film magazines with workbench locations that are equipped with similar retrieval equipment.

In conclusion, this tested concept for an EDS&R System appears to overcome many of the objections that have been voiced in adopting a standardized "universal" system. It is important to reemphasize that the EDS&R project will evaluate and document existing information systems and equipments, not invent new ones. From these evaluations, recommended procedures, standards and improvements on existing systems will be documented and recorded. Only in information areas where "voids" exist will any development work take place.

Through optimization of the EDS&R concept, the universal availability and quick retrieval of engineering data are envisioned as becoming a reality.

'No Man Walks Alone' Author Visits WRGH

No Man Walks Alone has been popular reading at Walter Reed General Hospital (WRGH) ever since the author, Navy Lt Cmdr Frank Ellis, personally delivered copies to the hospital library.

The book tells how Ellis lost both legs in a jet crash in 1962 and how, undeterred by his handicap, Lt Cmdr Ellis has succeeded in qualifying as a NASA research pilot and hopes to qualify as an astronaut. He also drives a car and pursues an active life of waterskiing, football playing and bicycle riding.

Shown accepting the books for WRGH are Sp/4 Thomas Curry, Pfc John Widdle and Col Martin J. Carr, chief of Administrative Services at the hospital.

Cmdr Ellis toured Wards 34 and 35 to tell the patients of his experiences as an amputee and to pass around his prosthesis for them to examine. The morale of the patients soared as they saw proof of a handicapped man who has made a remarkable adjustment.

"I consider myself fortunate," Ellis told the patients. "I survived the plane crash, and am able to carry on a relatively normal life. I have too much to accomplish and plan to do it with a positive viewpoint."

Anxious to return to flying, he did not take time to feel sorry for himself. Instead, he turned all his energy and will power toward achieving objectives that to others less determined might have appeared impossible dreams.

U.S. Completes Delivery of 40 MAB Units to Belgium

U.S. Army research and development of methods of moving troops and equipment across water barriers such as rivers and streams, by rapid emplacement of bridges or ferries, is benefiting the government of Belgium.

Delivery of 40 units of the U.S. Army Mobile Floating Assault Bridge/Ferry (MAB) began in December 1967 and is scheduled to be completed this month. The MAB is the newest and most effective amphibious river-crossing equipment in the U.S. and Belgium Armies, said an Army Materiel Command spokesman.

Varying numbers of the units have been linked together to conduct bridge/ferry operations across bodies of water. The maximum to date, as reported by Julius Hein, U.S. acting deputy project manager for the MAB at St. Louis, Mo., is the linking of 12 units to form a 334-foot span.

The MAB is a 4-wheel drive amphibious vehicle which is self-propelled in the water by a 28-inch shrouded propeller. The propeller can be rotated 360 degrees for steering and reversing. It also can be lowered as far as 16 inches below the bottom of the unit to permit most efficient operation in shallow or deep water, and it can be put in an elevated position for road travel.

TWELVE MAB units provide 334-foot bridge span for river crossing.

The end bay superstructures and the interior bay superstructures are carried on the same self-propelled transporter. Carried in a folded position and extended in water by two hydraulic cylinders, the end bay is 37 feet long and weighs 10 tons. The interior bay is 26 feet long and weighs 7 tons. Both are constructed of welded steel and aluminum.

The carrier vehicles go directly into the water from road travel without preliminary preparation. Carried lengthwise on land, the superstructures are rotated hydraulically 90 degrees and connected for bridging operations.

MAB units can travel over land at speeds up to 42 mph and 3-man crews on each of four vehicles can assemble a 4-unit ferry in 6 minutes. Carrying a 60-ton load, the ferry moves up to 8 mph. Individual units travel in water at 10½ mph. Loads of 60 tons can cross the bridge, such as the 334-foot maximum span to date, at intervals of 100 feet.

Interest of the Belgian government in the MAB originated with a demonstration by the U.S. Army in 1965 and two contracts were awarded in March 1966. Space Corp., Garland, Tex., contracted to deliver 40 transporters and Consolidated Diesel Electric Corp., Old Greenwich, Conn., bid successfully to furnish 44 superstructures. The four extra superstructures were bought as replacements in event of damage.

Extensive static and operational tests were conducted as part of the contract, followed by reliability operational testing, all monitored by the United States Government. The units exceeded all technical requirements.

Upon delivery of the first units to Belgium, a U.S. Customer Relations Team directed by the U.S. Army Materiel Command project manager was designated to introduce the initial units to Belgian officials. Then a U.S. Army Mobility Equipment Command team was assigned to train Belgian military personnel in operation and maintenance of the MAB units.

Assault Bridge Undergoing Production Unit Tests

Production unit testing of a lightweight assault bridge, developed for use in the rice paddies and swamps of Vietnam, was announced Oct. 28 by the U.S. Army Mobility Equipment Research and Development Center.

Carried and launched by the M–113 Armored Personnel Carrier, the unit is the first of 29 being fabricated under an $833,000 contract awarded by the MERDC, Fort Belvoir, Va., to the Unit Rig and Equipment Co., Tulsa, Okla.

Current plans provide for shipment of 24 units to Vietnam for field evaluation. Five of the units will be held in the U.S. for continued research, development and testing.

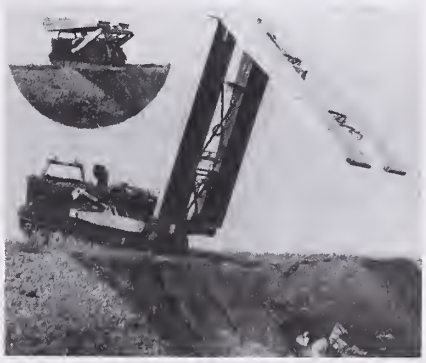
Weighing 2,700 pounds, the bridge can be emplaced where a heavier unit would bog down. Capable of supporting 15-ton loads over spans up to 33 feet, the folding-type bridge is of weldable aluminum construction.

Carried in a folded position, the unit can be emplaced hydraulically in less than two minutes without exposure of personnel. After manual hookup of two hydraulic connections, it can be retrieved by reversing the launching procedure. When loaded with the bridge, the carrier has the same swim capability of 3.5 mph as an unmodified carrier.

An extruded orthotropic plate deck is used rather than the traditional stringer-floor beam design, making the roadway surface a load-carrying member and thereby contributing to the lightweight construction. Two tapered sections are hinged to form one treadway and the two treadways are joined by bolted cross braces to form the roadway.

A double-centered noneccentric hinge, at the folding point of the two leaves of the bridge, provides a completely flushbottom flange when the bridge is in the open position. The launching mechanism, constructed of an aluminum alloy, uses a 3-link connection and is pin-connected to the vehicle at six points.

The bridge was designed and the prototype was fabricated at the MERDC metal-working shop as an in-house project.



LIGHTWEIGHT assault bridge carried and launched by M–113 vehicle.

ASA (R&D) Compares Army, Industrial Labs

(*Continued from page 2*)

hybrid transistorized circuits to hybrid integrated circuits to large-scale integration in a matter of a very few years."

Government and industrial laboratories have similar difficulties, in his opinion, of making a good assessment of how well they are performing, although product-oriented laboratories have an easier job in this regard.

Among criteria indicative of how well laboratory personnel are performing, Dr. O'Neal said, are the number of papers published, patents granted, products developed as directly traceable results of research, and how quickly new products are developed. The best method, in his view, is to establish definite objectives and continually assess how well they are achieved:

"Management can then approve, modify, or add to these objectives. Not only can laboratory management be judged by how well it meets objectives, but also it can be partly judged by the quality of objectives it recommends.

"Another similarity between government and industrial laboratories is that both have difficulty in selling themselves to their top management. The communication and coupling between the laboratory director and his corporate management, if you will, is often his most difficult job.

"This coupling is, of course, particularly important because so much of the image of the laboratory depends upon it. It is much easier to carry out this communication if the corporate management has technical training.

"I have been impressed, in the Army, that the Army has many senior officers who do have technical training and can appreciate the implications of technical developments. However, it is not always the case that the best support comes from technically oriented people.

"I think that a case in point is the fact that a number of the congressmen who are the best supporters of research are not technically oriented, but . . . have a lot of vision and a tremendous curiosity. We get some of our best support from such people."

Dr. O'Neal pointed to the similarity of the requirements that government and industrial laboratories have in coupling their work with production engineering and production. He explained difference in courses of action to achieve objectives, saying:

"Most large multi-division corporations have engineering departments in each of their divisions and, in many cases, these departments do very extensive applied research. In addition, most of these corporations have a central research laboratory that does more fundamental work and tries to cover the broad spectrum of the corporation.

"In the Army we have a long history in our laboratories and they do not necessarily form the pattern that we would like to see. In our long-range plan, of course, we do intend, and have already accomplished in a number of cases, the establishment of centers of excellence in each of the commodity commands.

"I know that General Besson (commanding general of the Army Materiel Command since its inception in 1962) feels that it is quite important that the laboratories be in close proximity to the command so that there can be a very close tie-in between the research and development and the production and operational requirements.

"I agree with him that if one can have close proximity of personnel, then the job of moving from R&D into production is made considerably easier. I won't say that it is ever made easy because it is always a difficult job."

After discussing some of the problems industry encounters in moving from R&D or engineering into production, Dr. O'Neal stated:

"The results of R&D are useful, of course, in a relevancy-oriented organization when they can be put into use, and this normally means put into manufacturing. Consequently, we have to solve this coupling problem. Otherwise we are not doing our job, or at least only partly doing our job.

"In industry, I have seen a great deal of difficulty, and not only in this transfer from engineering to production, even in an organization where the people are physically in the same organizational element and physically located close together.

"Even greater difficulty may arise when central laboratories try to introduce their products into manufacturing-oriented organizations. Very often there is competition between central and divisional organizations.

"Sometimes this is healthy, but I think more often than not it tends to be destructive. I believe that getting a product transferred can be done most effectively through the transfer of people—that is, having people from a production-oriented organization transferred to a central laboratory during the latter portion of the development of a product.

"Moving those personnel together with some of the laboratory personnel to an operating division provides a cadre of people who really know what the job is all about and what the problems are in bringing it into manufacturing fruition. This is something we might do more of in our government organizations.

"One thing which I feel is very healthy in a multidivision corporation is undertaking a large program that requires the capabilities of a number of divisions. The lead division concept is generally used. That is, the division having the largest part of the job or, more importantly, the division best understanding the over-all job is given the prime responsibility and all other divisions are asked to work with that division.

"There are a number of key rules to follow in doing this:

- Break the job and the responsibilities down into packages that have logical interfaces, and then monitor the interfaces carefully.
- Have a brief, clearly written description of the over-all job.
- Get the leaders together frequently. Don't let the people get away with saying, 'So long, I'll see you when the job is done.' There is a great temptation after the first orientation for everyone to go home and work away on his own part of the job without proper coordination.
- Permanent liaison people usually have to be moved from one organization to another. Make sure the liaison people are made part of the working organization and physically live with the people doing the work.

"Problems that arise are: Who

SCIENTIFIC CALENDAR

Institute on Management and Technology in Printing and Publishing, sponsored by the American University's Center for Technology and Administration, Washington, D.C., Jan. 13-15.

Conference on Atomic, Molecular and Solid-State Theory and Quantum Biology, Sanibel Island, Fla., Jan. 13-18.

2d Annual Simulation Symposium, Tampa, Fla., Jan. 15-17.

7th Aerospace Sciences Meeting, sponsored by AIAA, N.Y.C., Jan. 20-22.

Annual Reliability Symposium, sponsored by IEEE, Chicago, Ill., Jan. 21-23.

U.S. Army Laboratory System Meeting, sponsored by AMC and AOA, Pasadena, Calif., Jan. 22-23.

Conference on Fundamental Interactions at High Energy, sponsored by OSR, Coral Gables, Fla., Jan. 22-24.

Winter Power Meeting, sponsored by IEEE, N.Y.C., Jan. 26-31.

International Symposium on Information Theory, sponsored by IEEE, Ellenville, N.Y., Jan. 28-31.

1969 Symposium on Unconventional Inertial Sensors, sponsored by ONR, Brooklyn, N.Y., Jan. 29-30.

Health Physics Operations Monitoring Meeting, Los Angeles, Calif., Jan. 29-31.

Titanium Coordination Meeting, sponsored by AFML, Wright-Patterson AFB, Ohio, January (date undetermined).

pays for what? With different profit centers there is a tendency to be suspicious of one another. Who gets what part of the production? Again, this is affected by the profit motive.

"However, this type of operation can be effective and has a number of important side effects. I have been pleased to see this type of operation being used more frequently in our Army laboratory system.

"You will be surprised at this next similarity. Salaries are fairly comparable betweeen industrial labs and government labs, at least in the middle management area. I had been under the impression that there was a large discrepancy in salaries before joining the Army. However, I think that this is now largely a myth due to what has been done by the government in improving the salary structure of its personnel.

"Note that I said salaries are comparable between industry and government. It is true that industry does have added compensation in many other cases for top management. This is in the form of stock options and supplementary compensation which, in many cases, can be appreciable. However, the new regulations on stock options make them less attractive than they were before. Also, the number of people who participate in supplementary compensation is usually quite small.

"On the other hand, the government personnel have a number of advantages that the industrial personnel do not have. One of the most important of these, in the minds of many people, is security. . . . Many industries will let people go rather quickly when times are bad.

"This is less true of monopolistic industries, but even there I think the security is less than in government laboratories. Also, government personnel have a much more liberal vacation policy. This can be quite important to people in terms of raising families, etc.

"Now I would like to turn to differences. I think one of the most important differences is the fact that it is easier to weed out mediocrity in industrial laboratories than in government laboratories. The very advantage that I just mentioned of security does make it difficult in a government laboratory to discharge people who are not carrying their weight.

"Again, in monopolistic industries one finds that there is less likelihood to weed out incompetence than in the more competitive industries. It is true that the Civil Service basic policies do permit more latitude in terms of weeding out personnel than I think we often take advantage of in our government laboratories.

"However, people tell me that they have to spend an inordinate amount of time in correcting a situation where there is mediocrity. They tell me that so much paperwork has to be filled out because of the appeal policy of Civil Service I think that, in general, the government laboratories suffer from the same kind of thing that occurs in unionized production plants in industry. That is, there is a much greater requirement to consider seniority rather than merit. At least, this is the impression most people seem to have.

"Another difference, which has certainly been true in the past, is that a good man has the opportunity to move up the ladder faster in industry. I believe that there may not be as great a difference now as there has been in the past, but still I think that there is a difference in that industrial laboratories find it easier to reward for merit.

"I think another difference is that it is easier to move people in industry than in government; that is, to move people from one laboratory to another or from engineering into manufacturing for periods of time. As a matter of fact, industry often moves people purposely as part of executive development.

"Another difference is, I believe, that government laboratories find it easier to get equipment than do industrial laboratories. As a matter of fact, I feel that our government laboratories are pretty well equipped.

"On the other hand, industry usually has better brick and mortar and is more likely to be housed in what might be considered more luxurious and more glamorous quarters. Many industries have made a point of establishing their laboratories in what might be called a campus atmosphere.

"Still another difference is that I believe there is less freedom in the type of work to be done in industrial laboratories than in government laboratories. You may question this because of the various reviews, etc., that take place in government laboratories.

"Industrial laboratories are usually pretty well circumscribed as to what kind of research they can do, and they are more motivated to develop a product that can be manufactured and on which a profit can be made quickly.

"In industrial laboratories the management of personnel can, in general, move more quickly than in government laboratories; that is, they can change a course of action and carry out a new development more quickly because fewer approvals are required.

"This may seem contradictory to my previous point. However, I do not think this is so. Once a course of action is set, then the industrial laboratories can move much more quickly. However, I believe government laboratories have greater freedom, in terms of the general course they can follow, than do industrial laboratories . . ."

Watervliet Arsenal Meet Deals With Brittle Fracture

One of the priority areas of Army basic research effort, an Army Research Office-Durham (N.C.) theme project titled "The Principles and Mechanisms of Brittle Fracture," brought 30 leading scientists together at a recent progress review conference at Watervliet (N.Y.) Arsenal.

Fractures in materiel components caused by brittleness in metals due to stress deterioration or other factors are a matter of serious concern to Army leaders dealing with the problem of reliability.

Research being performed by Army in-house laboratories or under contracts and grants with industrial and academic organizations is aimed at overcoming brittleness and increasing the ductility and toughness of metals used in weapons and other military equipment.

Dr. James K. Magor and Dr. H. M. Davis, members of the professional staff at the Army Research Office-Durham, served as chairmen for the two days of presentations and discussions. Watervliet Chief Scientist Dr. Robert E. Weigle was in charge of arrangements at the arsenal.

In addition to the reports on research being performed by Army in-house laboratories, the review included presentations on work under contracts or grants with Columbia University, University of Southern California (Los Angeles), Rensselaer Polytechnic Institute, University of Minnesota, Cornell University, Indiana University Foundation, Allied Chemical Co. and Battelle Memorial Institute.

Dr. Vincent Schaefer, director of the Atmospheric Science Research Center of the State University of New York at Albany, was the guest speaker at the dinner meeting. He is recognized as one of the nation's distinguished authorities on environmental problems, including those concerned with air pollution.

CDC Commanders (from left) Brig Gen G. W. Casey, Maj Gen W. J. McCaffrey, Maj Gen W. A. Becker, Lt Gen H. W. O. Kinnard, Brig Gen W. R. Reed, Maj Gen J. H. Hay, Brig Gen A. L. Friedman, Brig Gen F. C. Roecker, Brig Gen W. L. Clement. Picture was taken during recent meeting at U.S. Army War College.

CDC Commanders Discuss Army's 1975-85 R&D Needs

Projected plans for materiel, doctrine and organizational developments of the U.S. Army in the time frames of 1975 and 1985 were examined closely by 65 senior officials of the Combat Developments Command (CDC) at a Commanders' Conference.

Commanding officers of CDC's 17 branch developments agencies, seven study institutes and other command elements participated. Headquarters Directorate chiefs accompanied Lt Gen H. W. O. Kinnard, CDC commanding general, to meetings held in the Army War College, Carlisle Barracks, Pa.

Discussions were focused on CDC appraisals of how the Army will fight, be equipped and be organized in the future, based on Army–75 and Army–85 studies. Participants also considered issues of CDC and Army-wide impact concerning advanced plans.

Among other subjects highlighted on the agenda for the 3-day meeting were consideration of lessons learned in Vietnam, the role of Army airborne forces, night and all-weather equipment, tactical data processing, the changing roles of signal intelligence and electronic warfare, and the CDC civilian career program.

Host for the sessions was the CDC Institute of Advanced Studies commanded by Maj Gen W. J. McCaffrey, who also is commandant of the Army War College. Brig Gen Wallace L. Clement, CDC chief of staff, presided.

Other major CDC commanders in attendance included Maj Gen W.A. Becker, CDC Deputy CG; Maj Gen J. H. Hay Jr., CG, Institute of Combined Arms and Support, Fort Leavenworth, Kans,; Brig Gen G. W. Casey, CG, Combat Arms Group, Fort Leavenworth; Brig Gen A. L. Friedman, CG, Combat Service Support Group, Fort Lee, Va.; Brig Gen W. R. Reed, CG, Automatic Data Field Systems Command, Fort Belvoir, Va.; and Brig Gen F. C. Roecker, CG, CDC Experimentation Command, Fort Ord, Calif.

Top scientific advisers present included David C. Hardison, HQ CDC, Dr. M. R. Bryson, Institute of Systems Analysis, Fort Belvoir, and Dr. W. L. Archer, Institute of Land Combat, Fort Belvoir.

GETA Completes Production Testing of FARE

Initial production testing of the Forward Area Refueling Equipment (FARE) for Army aircraft and combat weapons was completed recently by the U.S. Army General Equipment Test Activity (GETA). Similar tests of a 12-Point Helicopter Refueling System are under way.

FARE is designed to deliver aviation gasoline, JP–4 fuel or MOGAS from collapsible fuel storage tanks to any or all four nozzle assemblies in refueling rotary-and fixed-wing aircraft and combat vehicles.

The lightweight, air-transportable system consists of three separate components housed in tubular aluminum frames. The pump assembly has a standard gasoline engine, fuel tank and rotary vane pump. The filter—separator assembly contains the filter elements through which the fuel flows prior to delivery. A hose and fitting kit completes the system.

The 12-point system consists of standard military equipment, including a skid-mounted 350-gpm filter/separator/pump, 12 dispensing nozzle assemblies, manifold and dispensing hoses, various sizes and types of cam-lock fittings and a 50,000-gallon collapsible fuel tank. All components are designed for air transport by U.S. Air Force aircraft and by Army CH–47 and CH–54 helicopters.

Intended for use in refueling 12 military helicopters simultaneously in a tactical environment, the system is expected to deliver fuel at a minimum filling rate of 25 gpm to each aircraft. It can be replenished by Army tank trucks.

FARE, developed by the Army to service fixed- and rotary-wing aircraft under tactical conditions, was given recent engineering and service tests by U.S. Army General Equipment Test Activity, headquartered at Fort Lee, Va.

☆ U. S. GOVERNMENT PRINTING OFFICE : 1968 342-875/5